



Changes for the Better

700/70 Series

OPERATION TRAINING MANUAL



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Operating the Setting and Display Unit

1. Operating the Setting and Display Unit

1.1 Setting Display Unit Appearance

1. Operating the Setting and Display Unit

This explains the functions common to the screens.

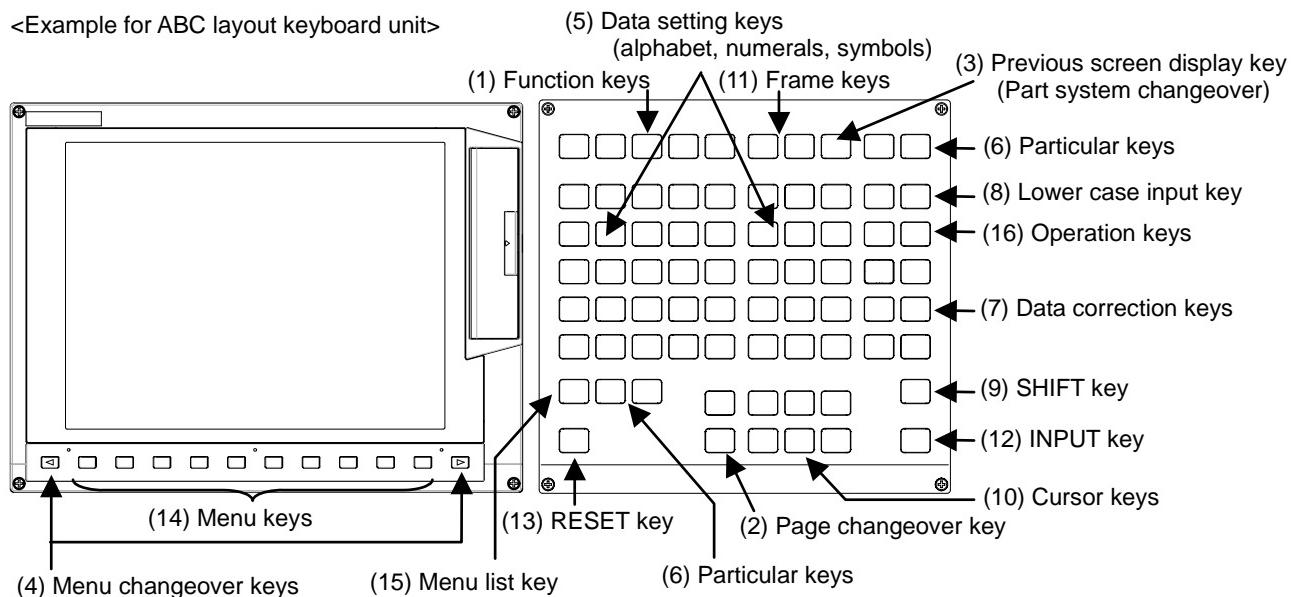
1.1 Setting Display Unit Appearance

An LCD display is used for the screen displays.

Operations such as screen transition and data setting are carried out with the NC keyboard.

The setting display unit is configured of the LCD display, various keys and menu keys as shown below.

The drawing below shows a horizontal layout of the LCD display and NC keyboard, but these can also be arranged vertically.



The following keys are provided on the keyboard.

	Key type	Key	Operation
(1)	Function key (Function selection key)	(MONITOR)	This displays the screen related to "operations". (Refer to "2. Monitor Screens".)
		(SET UP)	This displays the screen related to "setup". (Refer to "3. Setup Screens".)
		(EDIT)	This displays the screen related to "editing". (Refer to "4. Edit Screens".)
		(DIAGN)	This displays the screen related to "diagnosis". (Refer to "5. Diagnosis Screens".)
		(MAINTE)	This displays the screen related to "maintenance". (Refer to "6. Maintenance Screens".)

1. Operating the Setting and Display Unit

1.1 Setting Display Unit Appearance

	Key type	Key	Operation																																																
(2)	Page changeover key	 Previous page key	When the displayed contents cover several pages, this displays the contents of the previous page. The "▲" mark at the top of the screen indicates that there is a previous page.																																																
		 Next page key	When the displayed contents cover several pages, this displays the contents of the next page. The "▼" mark at the top of the screen indicates that there is a next page.																																																
(3)	Previous screen display key (Part system changeover)	 BACK  Previous screen display key	This redisplays the previously displayed screen.																																																
		 \$↔\$  Part system changeover key	When using a multi-part system NC, this displays the data of the next part system. The screen does not change if it is a part system common screen or when only one part system is used.																																																
(4)	Menu changeover key	 (left side)	This changes the operation menu for the displayed screen to the current screen group screen selection menu. This is also used to cancel the menu operations of the displayed screen.																																																
		 (right side)	When all of the menus cannot be displayed at once, this displays the menus not currently displayed. The "◀" and "▶" marks at the bottom of the screen indicate that there are menus not displayed.																																																
(5)	Data setting keys	<table border="1" data-bbox="446 1102 743 1432"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr> <tr><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td></tr> <tr><td>M</td><td>N</td><td>O</td><td>P</td><td>Q</td><td>R</td></tr> <tr><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td></tr> <tr><td>Y</td><td>Z</td><td></td><td></td><td></td><td></td></tr> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>6</td><td>7</td><td>8</td><td>9</td><td>+</td><td>-</td></tr> <tr><td>=</td><td>/</td><td>.</td><td>;</td><td>etc.</td><td></td></tr> </table>	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z					0	1	2	3	4	5	6	7	8	9	+	-	=	/	.	;	etc.		These keys are pressed to set alphabetic characters, numerals and operation symbols, etc.
A	B	C	D	E	F																																														
G	H	I	J	K	L																																														
M	N	O	P	Q	R																																														
S	T	U	V	W	X																																														
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0	1	2	3	4	5																																														
6	7	8	9	+	-																																														
=	/	.	;	etc.																																															
(6)	Particular keys	 /   Help key   	These key definitions differ according to the machine tool builder.																																																

1. Operating the Setting and Display Unit

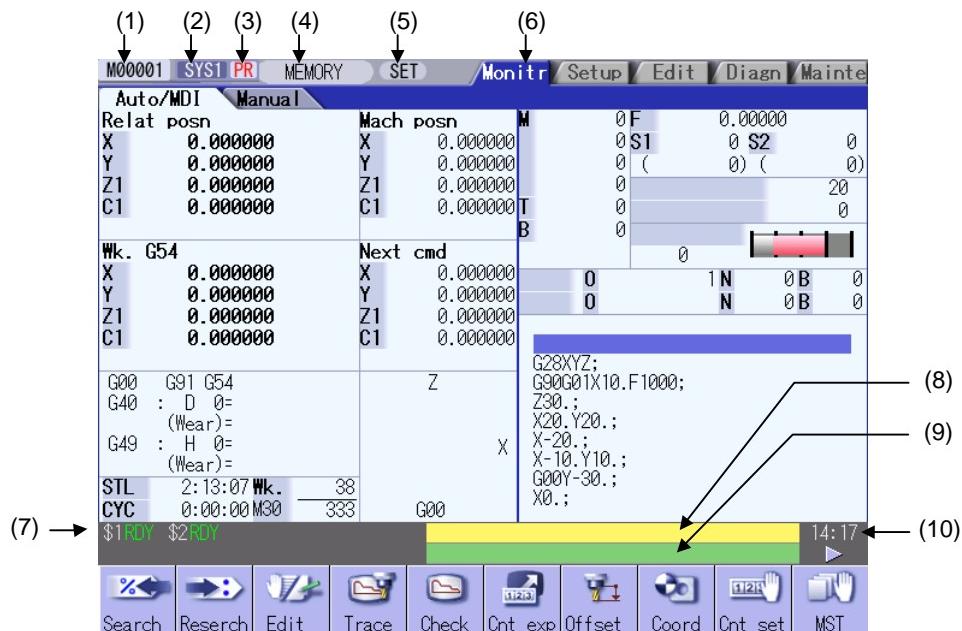
1.1 Setting Display Unit Appearance

	Key type	Key	Operation
(7)	Data correction keys	 (INSERT) Data insert key	This inputs the data insertion mode. When a data setting key is pressed, a character is inserted in front of the current cursor position. The overwrite mode is entered when the DELETE , C-B CAN , INPUT , cursor or TAB, etc., keys are pressed, or when the screen is changed.
		 (DELETE) Data delete key	This deletes the character just before the cursor position in the data setting area.
		 C-B CAN / C-B / CAN / (C-B CAN) Cancel key	This cancels the setting in the data setting area.
(8)	Lower case input key	 (LOWER CASE)	This changes the input between upper case and lower case alphabetic characters.
(9)	SHIFT key	 (SHIFT)	This validates the setting on the lower line of data key.
(10)	Cursor keys	   	This moves the cursor up or down one when setting data in the screen display items. This moves the cursor one item to the left or right when selecting data in the screen display items.  at cursor left end: Moves to the right end of previous line.  at cursor right end: Moves to left end of next line.
		 	This moves the data input cursor one character to the left or right in the data setting area.
(11)	Frame keys	 	This switches the tag.
(12)	INPUT key	 (INPUT)	This fixes the data in the data setting area, and writes it to the internal data. The cursor moves to the next position.
(13)	RESET key	 (RESET)	This resets the NC.
(14)	Menu keys		This changes the screen and displays the data.
(15)	Menu list keys	 (MenuList)	This is function that displays each screen's menu configuration as a list. (Refer to "1.7 Menu list")
(16)	Operation keys	 (ALTER)	This is alternate key (Alt key).
		 (CTRL)	This is control key.
		 (SP)	This is space key.

1. Operating the Setting and Display Unit

1.2 Screen Configuration

1.2 Screen Configuration



Display items

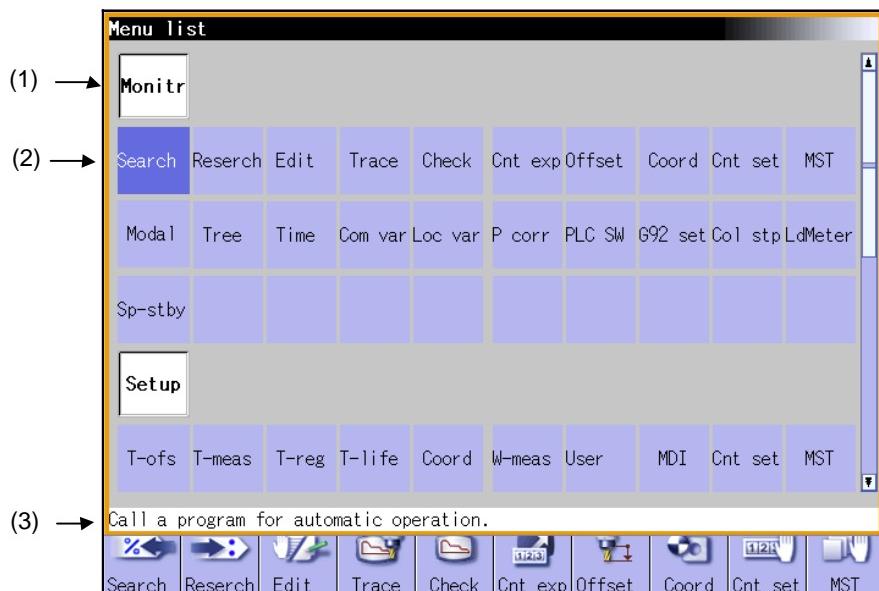
Display item	Details
(1) NC name	The currently displayed NC name (name set in parameter "#1135 unt_nm") is displayed.
(2) Part system name	When using the multi-part system, the currently displayed part system name (name set in parameter "#1169 system name") is displayed. The part system name is not displayed for the 1-part system.
(3) Power ON request	This appears if a parameter requiring the power to be turned ON again has been changed. This flickers at an approx. one-second interval.
(4) Operation status	The displayed part system's operation mode is displayed.
(5) MDI status	The MDI status is displayed when the MDI operation mode is selected. This does not appear when other operation modes are selected.
(6) Screen name	The tab for the currently selected screen is selected and displayed.
(7) Operation status	The NC operation status is displayed.
(8) Alarm	The currently occurring alarm or warning with the highest priority is displayed.
(9) Operation message	The operation message is displayed.
(10) Time	The current time is displayed. (Hour: minute)

1.3 Menu List

The menu list is a function that displays each screen's menu configuration as a list. The Menu list window opens when the **MenuList** key is pressed on each screen.

If a pop-up window other than the menu list is displayed, the Menu list window appears above the displayed pop-up window. The menu does not change in this case.

If the **MenuList** key is pressed again or if the **Cancel** key is pressed while the Menu list window is open, the Menu list window closes, and the state before the **MenuList** key was pressed is recovered.



Display items

Display item	Details
(1) Screen name	The screen name is displayed. (Example) Monitr/Setup
(2) Menu name	A list of the menu names (functions) included on each screen is displayed. (Example) Search/Reserch
(3) Function outline display area	An outline of the currently selected menu name (function) is displayed.

List of menu names (functions)

Screen	Menu name	Outline
Monitr	Search	Call a program for automatic operation.
	Reserch	Restart machining from a selected block.
	Edit	Edit the machining program searched for operation.
	Trace	Trace the T path based on the machining program being executed.
	Check	Trace the T path based on the machining program w/o running machine.
	Cnt exp	Display counters of all axes & select the type of the counters.
	Offset	Set & display tool offset data.
	Coord	Set & display workpiece coordinate system offset.
	Cnt set	Set the relative position counter to an arbitrary value.
	MST	Set & display each command for S, M, T & 2nd M functions.
	Modal	Display the execution modal value of the machining program.
	Tree	Display program/MDI interrupt/user macro call in nesting structure.
	Time	Set & display integrating time (date, time, power ON time, etc.).
	Com var	Set & display the details of common variables.
	Loc var	Specify a nesting level of subprogram & display local variables.
	P corr	Correct & change the next command by block stop during auto-/MDI op.
	PLC SW	Switch ON/OFF each NC ops. control signal allocated by ladder program.
	G92 set	Perform origin set & origin cancel.
	Col stp	Register arbitrary collation & stop position set as single block stop.
Setup	LD MTR	Spindle load and Z axis load, etc. can be displayed in meter.
	Sp-stby	The spindle tool No. and the standby tool No. can be displayed.
	T-ofs	Set & display tool offset data.
	T-meas	Measure T length & radius manually & set them as tool offset amounts.
	T-reg	Register T No. according to the magazine pot, spindle & wait position.
	T-life	Scale workpiece to figure face/hole ctr/wid ctr & set as coord ofs.
	Coord	Set & display workpiece coordinate system offset.
	W-meas	Set & display user parameters.
	User	Display & edit MDI programs set in NC memory.
	MDI	Edit (add/delete/change) programs in NC memory & create new ones.
Edit	Cnt set	Set the relative position counter to an arbitrary value.
	MST	Set & display each command for S, M, T & 2nd M functions.
	T-list	Reference & display T-codelist.
	Pallet	The machining program is registered into the pallet of APC.
Edit	Edit	Edit (add/delete/change) programs in NC memory & create new ones.
	Check	Trace the T path based on the machining program w/o running machine.
	NAVI	Create the part program simply.
	I/O	Input/Output machining programs betw. NC memory & external I/O device.

1. Operating the Setting and Display Unit

1.3 Menu List

Screen	Menu name	Outline
Diagn	Config	Display the H/W & S/W (S/W No. & version) configurations.
	Option	Display the details of the options registered in NC memory.
	I/F dia	Set & display input/output signals of the ladder program.
	Drv mon	Display drive diagnostic information. (servo/spindle/power supply).
	Mem dia	Set & display NC internal data.
	Alarm	Display a list of currently occurring alarms & their messages.
	Selfdia	Display the H/W & Operation stop state.
	NC Smp	Set Sampling parameter & Sample NC internal data.
	A net	Customer service is available by connecting NC with NC service.
Mainte	Mainte	Perform NC memory format/abs. para. setting/maint. data backup, etc.
	Param	Select a type of parameter to set & display the parameter values.
	I/O	Input/Output machining programs betw. NC memory & external I/O device.

1.3.1 Display the Menu Function Outline

Operation method

- (1) Press the **MenuList** key.



The Menu list window appears showing the selected screen's menu list at the top.

When the **MenuList** key is pressed while editing the file on the Edit screen, a prompt to confirm whether to save the program appears before Menu list window opens.

- (2) Using the \uparrow , \downarrow , \rightarrow , \leftarrow and page keys, move the cursor to the menu for which the function outline is to be displayed.



The function outline for the selected menu appears. The function outline does not appear if a menu with no name is selected.

The cursor does not move to the group name.

Directly Moving to the Menu Function with function key.

Operation method

- (1) Press the **MenuList** key.



The Menu list window appears showing the selected screen's menu list at the top.

- (2) Using the \uparrow , \downarrow , \rightarrow , \leftarrow and page keys, move the cursor to the menu to move to.



The function outline for the selected menu appears.

- (3) Press the **INPUT** key.



The selected menu function can be moved to directly. The menu is not moved to if a menu with no name is selected.

The Menu list window closes after moving.

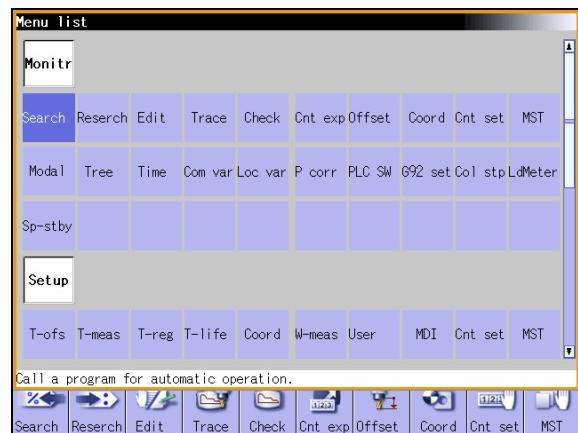
1.3.2 Moving the cursor

Operation method

(1) Press the **MenuList** key.



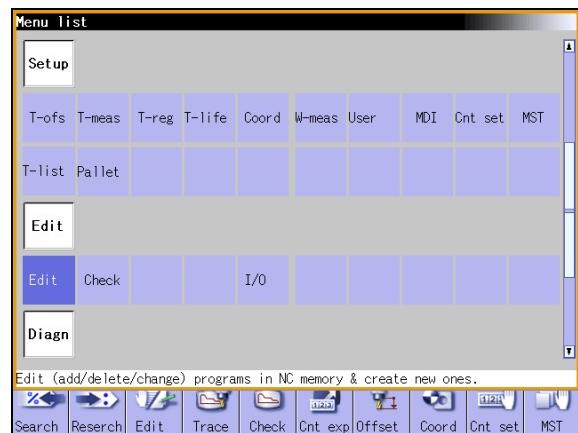
The Menu list window appears showing the selected screen's menu list at the top.



(2) Press the **↓↑←→** key four times.



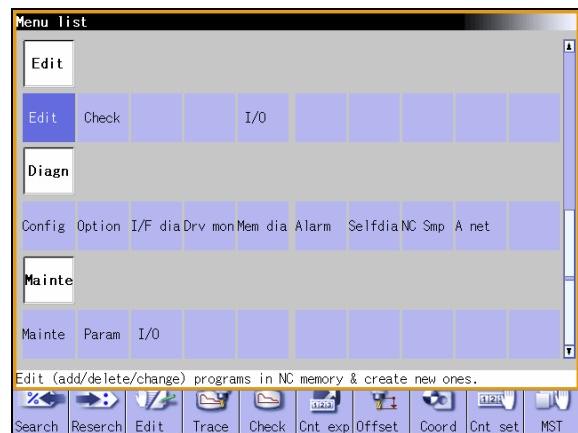
The cursor moves down four times, and the screen scrolls.



(3) Press the **Page ▼ Page ▲** key once.



The screen scrolls.



(Note 1) The cursor moves in the same way even when the **←** key is pressed.

(Note 2) The cursor moves in the same way even when the **→** key is pressed.

1.4 Operation Status

1 HLD 2 HLD 3 HLD 4 BST

The operation status displays the currently selected NC operation status for each part system. (The status for up to four part systems is displayed.)

Symbol	Details	Character color	Background color
EMG	In emergency stop	Red	Dark gray
RST	Resetting NC	White	Dark gray
LSK	Paper tape reader is in label skip state	White	Dark gray
BST	In block stop	White	Dark gray
HLD	Operation halted	White	Dark gray
SYN	Synchronizing	White	Dark gray
AUT	In automatic operation	White	Dark gray
RDY	Operation completed state	Green	Dark gray

1.5 Alarms/Warnings

When an alarm or warning occurs, the alarm No. and alarm message character string are displayed.

(Example) Warning display

S51 Parameter error

	Character color	Background color
Alarm	White	Red
Warning	Black	Yellow

1.6 Operation Messages

(Example)

Searching

	Character color	Background color
Operation messages	Black	Green

The operation message can be reset by pressing any key.

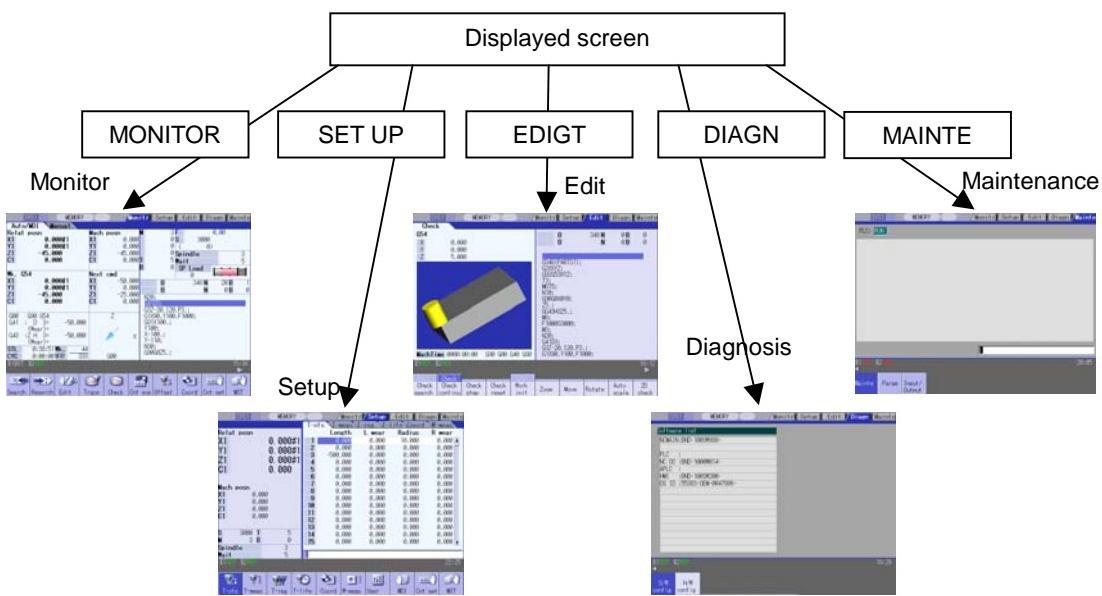
1. Operating the Setting and Display Unit

1.7 Changing the screen

1.7 Changing the screen

When the function selection keys are pressed, the displayed screen changes to the screen corresponding to the key. The displayed pop-up window closes.

If the function selection keys are pressed while editing the machining program or MDI program, a prompt to confirm whether to save the program appears before changing to the screen corresponding to the key.



1.8 Changing the displayed part system

When the **\$→\$ BACK** keys are pressed, the displayed part system changes.

The displayed part system No. is counted up by one each time the **\$→\$ BACK** keys are pressed. If the displayed part system No. exceeds the value number of part systems, the displayed part system No. returns to 1.

1.9 Types of Menus

The menus are categorized into the following types according to the operation that takes place after the menu key is pressed.

A : The menu is highlighted, and the system waits for the user input. After the input, the operation follows the input details.

B : The menu is highlighted, and operation starts.

C : Operation starts without highlighting the menu.

In section "2. Monitor screen" and following, the types are described in the following method.

(Example) Explanation of menus used for editing the program on the Edit screen (excerpt)

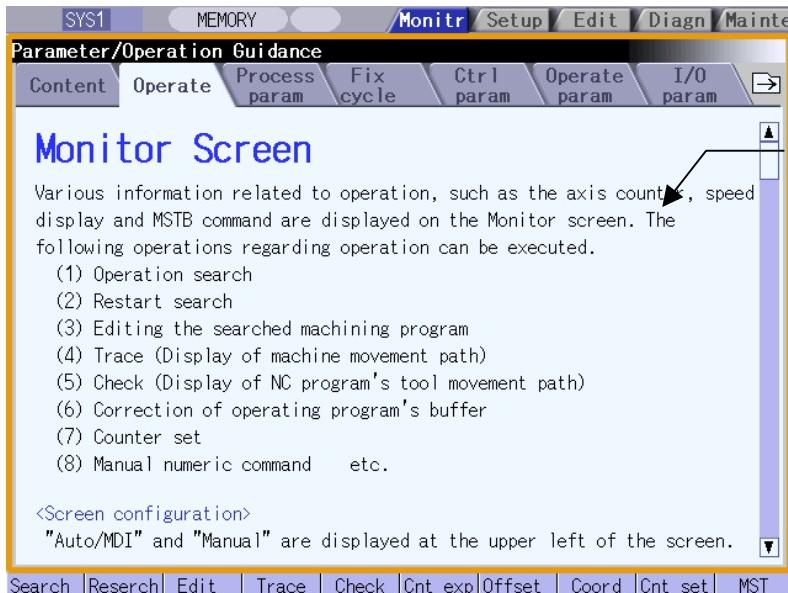
Menu	Details	Type	Reference
String search	When the character string is designated and the INPUT key is pressed, that character string is searched for.	A	4.2.11 Searching for character strings
String replace	If the character string to be searched for and the character string to be replaced are separated with a "/" and designated, when the INPUT key is pressed, the replace operation takes place.	A	4.2.12 Replacing character strings

1.10 Guidance Function

The parameter/operation guidance function displays the details of the parameters or the operation methods according to the state of the screen currently being displayed.

Screen configuration

The parameter/operation guidance window is displayed with the following type of configuration.



The parameter detail or operation method is displayed.

Operation method

If the **?** key is pressed on any screen, the guidance window will open. If a pop-up window other than the guidance window is open, the guidance window will open over the currently opened pop-up window. In this case, the menu state does not change. If **?** key or **CANCEL** key is pressed again when the guidance window is open, the guidance window will close and the screen will return to the previous state in which the **?** key was pressed.

1. Operating the Setting and Display Unit

1.10 Guidance Function

1.10.1 Parameter Guidance

Displaying the parameter guidance

(1) Press the [Param] menu on maintenance screen.



The machining parameter screen is displayed.

(2) Press the key, and move the cursor to "#8005 ZONE r" parameter.



No.	Name	Data	No.	Name	Data
8001	<WKR COUNT>	30	8012	<FIXED C. >	0.000
8002	WKR COUNT M	44	8013	673 n	0.000
8003	WKR COUNT LIMIT	333	8014	C02-VALE	0
8004	<AUTO TLM>	0	8015	C02-ANGLE	0
8005	ZONE r	0.000	8016	671 MINIMUM	0.000
8006	ZONE d	0.000	8017	671 DELTA-D	0.000
8007	<AUTO CORNER OVR. >	0	8018	684/674 n	0.000
8008	OVERRIDE	0	8019	<PRECISION>	
8009	MAX ANGLE	0	8020	R COMP	0
8009	DIG. ZONE	0.000	8021	Theor R decrease	2.296
8010	<T-TIP OFFSET>		8022	DCC. ANGLE	0
8010	ABS. MAX	0.000	8023	COMP. CHANGE	0
8011	INC. MAX	0.000	8024	CORNER COMP	0
8012	CURVE COMP	0	8025	CURVE COMP	0

(3) Press the key.



The guidance window is opened, and the detail of "#8005 ZONE r" parameter is displayed.

#8005 ZONE r

Contents
Set the distance between the measurement point and deceleration start point.

Setting range
0 to 99999.999 (mm)

(4) Press the key.



The operation method for parameter screen is displayed.

Parameter screens

The various parameters can be displayed and set on this screen.

<Changing the parameter display>
Changing to the computer Link parameters
1) Press the menu change key until the menu [Link param] appears.
2) Press the menu [Link param].

<Selecting the parameter No.>
Selecting the parameter No. 8071
1) Press the menu [Param No.]

(Note 1) While guidance window is displayed, the parameter details displayed on each parameter type tab are recorded. Therefore, when the parameter type is switched with / key, last displayed parameter details are displayed.

(Note 2) If the parameter No. cannot be gotten (the cursor is non-display, the cursor is put on blank line, the cursor is put on comment line), the top of parameter guidance for each parameter appears.

1.10.2 Alarm Guidance

The alarm guidance is the function that displays message, details and remedy for the currently occurring alarms.

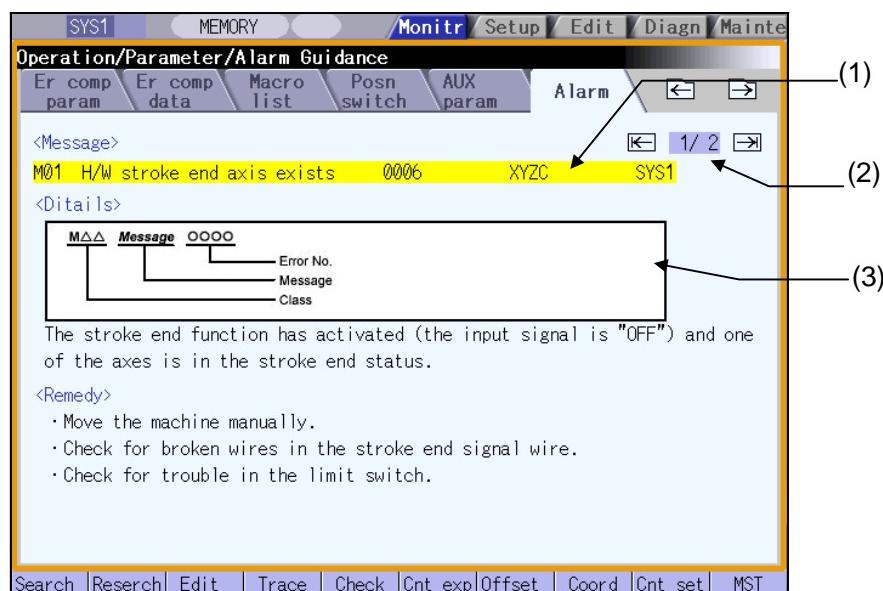
This function is an option.

Screen configuration

The alarm guidance is displayed in "alarm" tag on "operation/parameter/alarm guidance window".

The "alarm" tag is on the rightmost end of the guidance window.

A scroll bar appears when details and remedy, etc. do not fit in one page.



Display items

Display item	Details
(1) Message	This displays "NC alarm" and "PLC alarm message". The displayed content is same as the content displayed in the alarm message of the diagnosis screen.
(2) Number of page	This displays "order of priority / total number of occurring alarms".
(3) Details/Remedy, etc.	This displays detail and remedy, etc. for alarm message.

Operation method

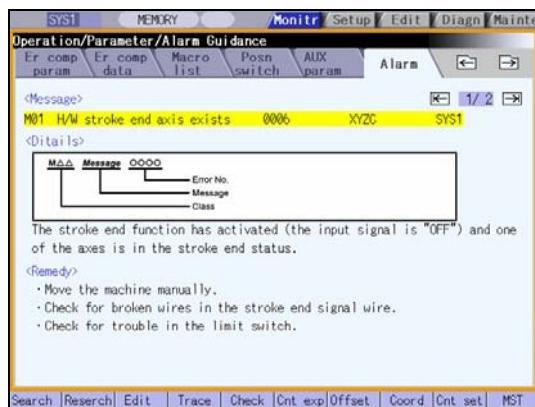
If the **[?** key is pressed on any screen, the alarm guidance window will open. If a pop-up window other than the alarm guidance window is open, the alarm guidance window will open over the currently opened pop-up window. In this case, the menu state does not change. If **[?** key or **CANCEL** key is pressed again when the guidance window is open, the guidance window will close and the screen will return to the previous state in which the **[?** key was pressed.

Displaying the alarm guidance

- (1) Press the **[?** key during occurring alarm on operation screen.
(Ex.) When "H/W stroke end axis exists" and another alarm occur.



The guidance window is opened while "alarm" tag is valid. The alarm details and remedy are displayed for "H/W stroke end axis exists".



- (Note 1)** The alarm guidance is executed for the alarm that is occurred when the **[?** key has been pressed. Therefore, the guidance will be displayed continually even if the alarm is reset while the alarm guidance is displayed. The alarm guidance is not executed for the alarm that has occurred while the alarm guidance is displayed.
- (Note 2)** If the **[?** key is pressed when an alarm is not occurring, the operation/parameter guidance appears. In this state, if the "alarm" tag is selected with the right frame key, nothing is displayed in the message, details and remedy columns. (These columns are blank.)
- (Note 3)** All the explanations of the alarm having the same error class and No. are displayed in the details column.

Monitor Screens

2. Monitor Screens

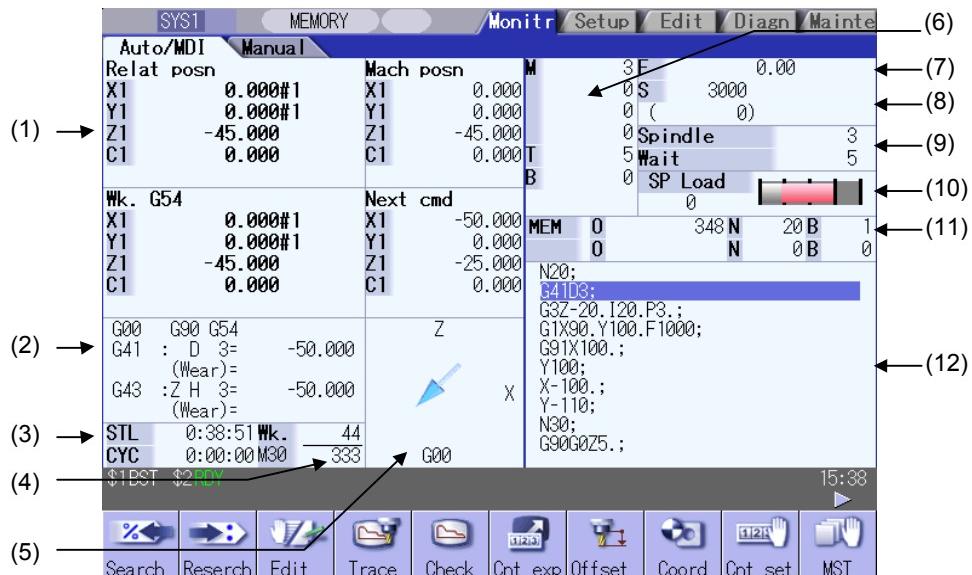
Various information related to operation, such as the axis counter, speed display and MSTB command are displayed on the Monitor screen. The following operations regarding operation can be executed.

- (1) Operation search
- (2) Restart search
- (3) Editing the searched machining program
- (4) Trace (Display of machine movement path)
- (5) Check (Display of NC program's tool movement path)
- (6) Correction of operating program's buffer
- (7) Counter set
- (8) Manual numeric command etc.

2.1 Screen Configuration

"Auto/MDI" and "Manual" are displayed at the upper left of the screen. These displays change according to the mode selection switch. The details displayed for [Auto/MDI] differ according to the number of NC axes.

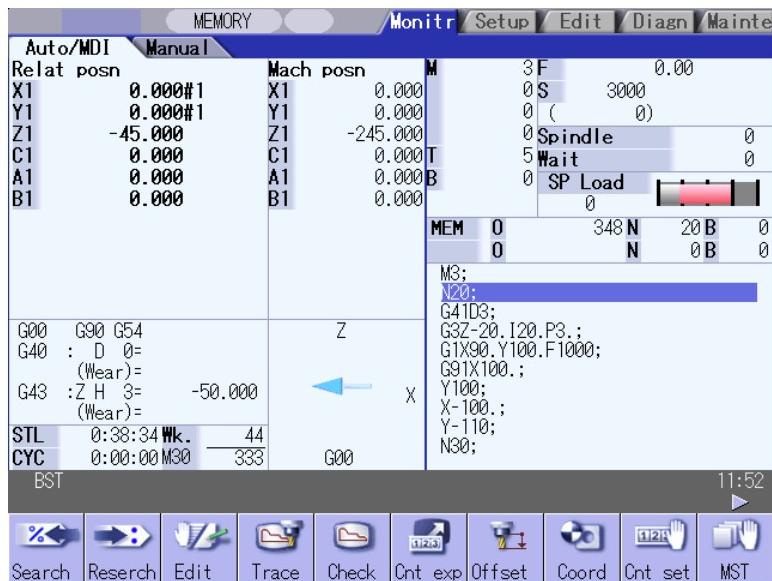
[For Auto/MDI (Part system with five or less axes)]



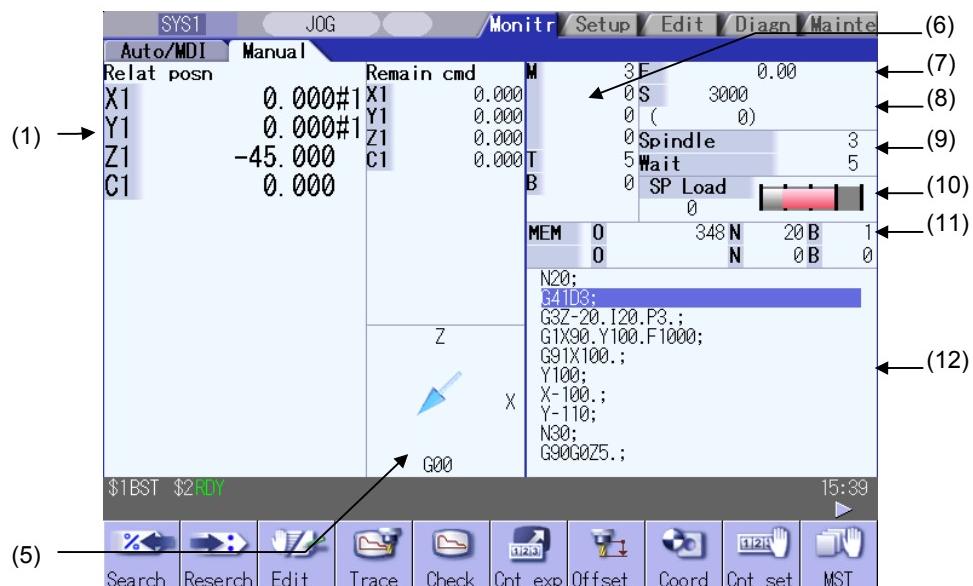
2. Monitor Screens

2.1 Screen Configuration

[For Auto/MDI (Part system with six or more axes)]



[For Manual]



2. Monitor Screens

2.1 Screen Configuration

Display items

Display item	Details
(1) Counter display	<p>This displays the counter of the relative position and workpiece coordinates positions, etc.</p> <p>If each axis is in a specific position or status, the following status symbol appears.</p> <ul style="list-style-type: none"> #1 to #4 : No. 1 to No. 4 reference position II : Servo OFF state MR : Mirror image >< : Axis removed state <p>Whether to allow for the tool length compensation and tool radius compensation can be set with the parameter "#1287 ext23/bit4".</p>
(2) G modal simple display	<p>This displays the modal status.</p> <ul style="list-style-type: none"> G command modal status of Group 1 G command modal status of Group 3 Selected workpiece coordinate system Tool radius compensation modal, compensation No. shape compensation amount, tool radius wear amount Tool length compensation modal, compensation axis name, compensation No., shape compensation amount, tool length wear amount
(3) Cycle time display	<p>This displays the automatic operation time and cycle time.</p> <p>The displayed items are switched with integrated time window.</p>
(4) Completed workpiece display	<p>This displays the number of workpieces which have been completed.</p> <p>The display follows the machining parameters "#8001 WRK COUNT M" to "#8003 WRK COUNT LIMIT".</p>
(5) Machine status animated display	<p>This displays the current tool No., tool type, next command movement direction, coordinate rotation status, mirror image status, and spindle rotation direction/coolant status.</p> <p>Note that the spindle rotation direction/coolant status display differ according to the machine tool builder.</p>
(6) M, T, B commands	<p>This displays the values command for M (miscellaneous function command value), T (tool command value) and B (2nd miscellaneous function command value).</p> <p>The presence of a 2nd miscellaneous function command value depends on parameter "#1170 M2name".</p> <p>Refer to "Manual numerical value command" for the manual numerical value commands.</p>
(7) Speed display	<p>In interpolation feed:</p> <ul style="list-style-type: none"> This displays the vector direction speed currently being moved in. <p>In each axis independent feed:</p> <ul style="list-style-type: none"> This displays the speed of the axis with highest speed. The actual machine feedrate is displayed with the parameters "#1125 real_f".
(8) S command, spindle actual rotation speed display	<p>This displays the S (spindle command rotation speed) and spindle actual rotation speed value.</p> <p>If there are two or less spindles, the S command value and the spindle actual rotation speed are displayed.</p> <p>If there are three or more spindles, only the S command value is displayed.</p>
(9) Spindle/Wait display	<p>The spindle tool No. and the standby tool No. are displayed.</p> <p>These displayed contents differ according to the machine tool builder.</p>
(10) Load meter display	<p>The spindle load and Z axis load, etc., are displayed in a bar graph.</p> <p>If Spindle/standby display is not being used, a load meter can be displayed in the Spindle/standby display area. These displayed contents differ according to the machine tool builder.</p>

2. Monitor Screens

2.1 Screen Configuration

Display item	Details	
(11) Machining program currently being executed (Note)		
Main 010...	This displays the program No., sequence No. and block No. currently being executed.	
Sub 01234...	When a subprogram is being executed, this displays the subprogram's program No., sequence No. and block No.	
(12) Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted.	

(Note) If the program No. (program name) exceeds 12 characters, "*" will appear at the 12th character.

Menus

Menu	Details	Type	Reference
 Search	This executes operation search.		2.2 Operation Search
 Reserch	This executes restart search.		2.3 Restart Search
 Edit	This edits the machining program in search.		2.4 Program Edit
 Trace	This executes trace.		2.5 Trace
 Check	This checks the program. This menu does not appear if the program check function option is not provided.		2.6 Program Check (2D) 2.7 Program Check (3D)
 Cnt exp	This enlarges the counter, and displays the counters for all axes.		2.8 Counter All-axis Display
 Offset	This displays the tool compensation amount. A value can also be set for the tool compensation amount.		2.9 Tool Offset Amount
 Coord	This displays the workpiece coordinate system offset. A value can also be set for the workpiece coordinate system offset.		2.10 Workpiece Coordinate System Offset
 Cnt set	A arbitrary value can be set in the relative position counter.		2.11 Counter Set
 MST	This executes a manual numerical value command.		2.13 Manual Numerical Value Command

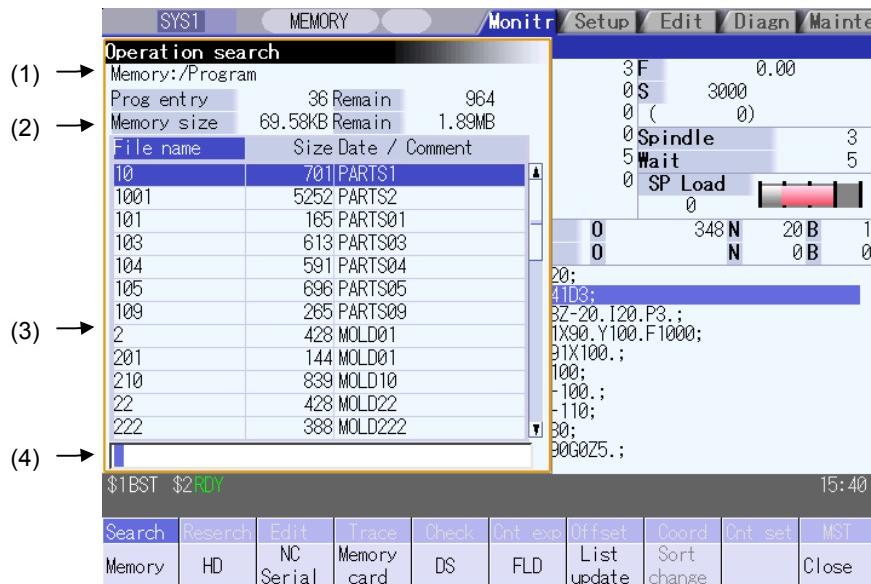
2. Monitor Screens

2.1 Screen Configuration

Menu	Details	Type	Reference
 Modal	This displays the program modal.		2.14 Modal Display
 Tree	This displays the program tree.		2.15 Program Tree Display
 Time	This displays the date, time and integrated time, etc., The date, time and integrated time, etc., can also be set.		2.16 Integrated Time Display
 Com var	This displays the common variables. A value can also be set for the common variable.		2.17 Common Variables
 Loc var	This displays the local variables.		2.18 Local Variables
 P corr	This corrects the buffer.		2.19 Buffer Correction
 PLC SW	This turns the PLC switches ON or OFF.		2.20 PLC Switch Function
 G92 set	This sets and cancels the origin.		2.12 Origin Set, Origin Cancel
 Col stp	This executes verify stop.		2.21 Verify Stop
 LdMeter	The spindle load and Z axis load, etc., are displayed in a bar graph. These displayed contents differ according to the machine tool builder.		2.22 Load Meter Display
 Sp-stby	The current spindle tool No. and the standby tool No. are displayed. These displayed contents differ according to the machine tool builder.		2.23 Spindle, Standby Display

2.2 Operation Search

On this screen, the program can be called from the program storage site, such as a memory, by designating the program (program No.) to be automatically run and the program start position (sequence No., block No.).



Display items

Display item	Details
(1) Device name, directory display	This displays the device name and directory designated when the program was selected.
(2) Capacity display	This displays the capacity of the device displayed in (1).
(3) List of directories and files	This displays a list of the contents contained in the device or directory displayed in (1). Use ↑ and ↓ to scroll the displayed list. If the device is an HD, FLD, memory card or DS, the file update date/time is displayed in the <Date/Comment> field. For the NC memory, the machining program comment is displayed. Whether to show or hide the comment field can be selected by pressing the Comment nondisp menu. When the comment field is hidden, the file name field will be enlarged. (Up to 13 characters can be displayed in the file name field when the comment is shown, and 32 when the comment is hidden.) If the file name exceeds the maximum number of characters, "*" will appear at the last character.
(4) Input area	This displays the input key details.

Menus

Menu	Details	Type	Reference
Memory	This selects the device for searching for the program. When a device with directory is selected, the route is selected first.	C	2.2.1 Executing an Operation Search
HD		C	
NC serial		C	
Memory card		C	
DS		C	
FLD		C	
List update	This updates the list contents. (The latest contents of the currently selected device and directory are listed.)	C	
Sort change	This changes the method that the list is sorted.	C	2.2.3 Changing the Sorting Method
Comment nondisp	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	B	2.2.2 Changing Whether to Show or Hide the Comment Field
Close	This closes the pop-up window and quits this function.	C	

(Note 1) Some items may not be displayed depending on the device.

○: Displayed ×: Not displayed.

Display item \ Device	Memory	HD	NC serial	Memory card	DS	FLD
Display item	○	○	×	○	○	○
Prog entry	○	○	×	○	○	○
Remain	○	×	×	×	×	×
Memory side	○	○	×	○	○	○
Remain	○	○	×	○	○	○
List	○	○	×	○	○	○

(Note 2) When using NC serial, the port number set with parameter "#9005 TAPE MODE PORT" is connected, and search.

2.2.1 Executing an Operation Search

Operation method

- (1) Select the part system to run with the **\$<->\$** keys. → The selected part system appears on the upper left of the screen.
- (2) Press the main menu **[Search]**. → The sub-menu appears.
The list appears as a pop-up window.
- (3) Select the device.
(Example) **[HD]** → The selected device name and route directory (HD:/) appear in the Device name, Directory display field.
- (4) Using the **↑**, **↓**, **↗** and **↘** keys, move the cursor to the directory containing the file to be set. → The following is displayed.

.	DIR
..	DIR
ABC	DIR
SRAM.BIN	1019904 Mar 06 14:54 2003
- If the list contents differ from the actual device or directory, press the menu **[List Update]**.
- (5) Press the **[INPUT]** key. → The active window changes to the directory.

.	DIR
..	DIR
123.PRG	62 Dec 20 15:24 2002
68.PRG	62 Dec 20 15:24 2002
69.PRG	166 Dec 20 15:24 2002
- (6) Using the **↑**, **↓**, **↗** and **↘** keys, move the cursor to the target machining program.
- (7) Press the **[INPUT]** key. → The search starts.
When the search is completed, the message "Search Complete" appears.
The searched device and program position appear in the field for displaying the machining program currently being executed.
The list closes, and the main menu appears again.

2. Monitor Screens

2.3 Restart Search

2.3 Restart Search

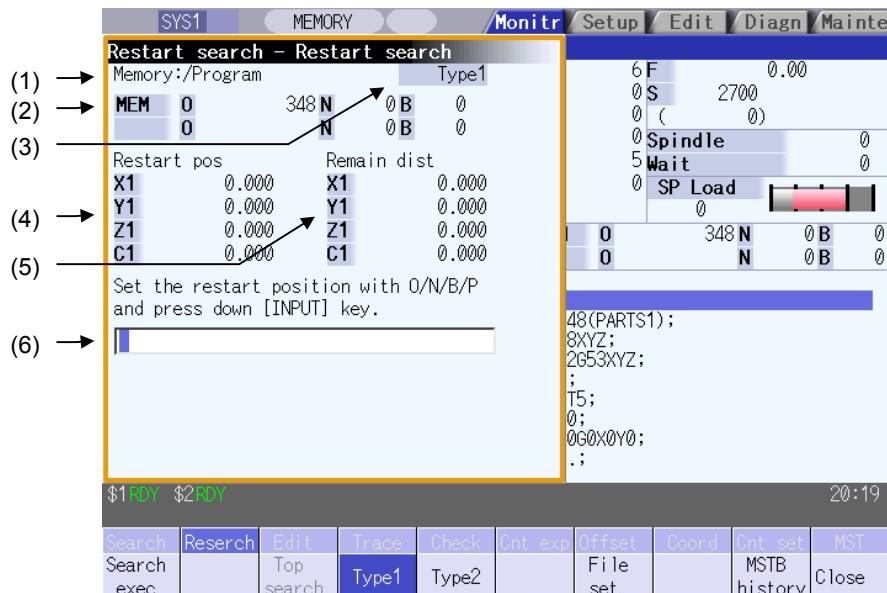
If machining is temporarily stopped due to tool breakage, etc., the program restart function searches for the block of the machining program to be restarted, and restarts machining from that block.

There are two types of restart, type 1 and type 2.

Restart method	Details
Restart type 1	After machining is reset due to a tool breakage, etc., machining is restarted from the designated sequence number and/or block number.
Restart type 2	After machining program is stopped due to a holiday, etc., and the power is turned OFF and ON, machining is restarted from the designated sequence number and/or block number.

2.3.1 Main Screen

The type 1 and type 2 restart search can be executed from the Main screen.



Display items

Display item	Details
(1) Device and directory display	This displays the device and directory where the searched machining program is located.
(2) Research position	This displays the researched main program position (program No., sequence No., block No.).
(3) Restart type	This displays the restart search type.
(4) Position when restart search is completed	This displays the position on the local coordinate system when the restart search is completed.
(5) Remaining distance when restart search is completed	This displays the remaining distance when the restart search is completed.
(6) Input area	This displays the input key details.

Menus

Menu	Details	Type	Reference
Search exec	This starts the restart search based on the designated device, directory, program number (O), sequence number (N), block number (B) and number of block execution times (P).	C	
Top search	This changes to the pop-up window for executing top search, and enables top search. When the type 1 is selected or the parameter "#8914 Auto Top search" is set, this menu cannot be selected.	B	2.3.2 Top Search Screen
Type1 Type2	This selects the restart search type. Restart search is executed with the highlighted restart type. The type 1 or type 2 menu is always highlighted. When restart search is executed, the selected restart type is displayed at the display item "(3) Restart type".	B	
File set	This changes to the pop-up window for setting the file, and enables the file to be selected.	B	2.3.3 File Setting Screen
MSTB history	This opens the MSTB history screen as a pop-up window. The M, S, T and B command used in the machining program are listed on the MSTB history screen. If the cursor is moved to the listed M, S, T or B command and the INPUT key is pressed, that command will be executed.	B	2.3.4 MSTB History Screen
Close	This closes the pop-up window and quits this function.	C	

2.3.2 Executing Restart Search (Restart Type 1)

When feed hold has been applied and reset because the tool has broken, etc., restart with Restart type 1.

Operation method

(Example) When tool breakage during execution of O1000 N7 occurred, and restarting from the O1000 N6 block.

- (1) Press the feed hold button and retreat to the tool change position by manual means or MDI.
Press the reset key and suspend the present processing.
- (2) Replace with a new tool.
- (3) When using tape operation, index the top of the tape.
- (4) Press the main menu **[Restart]**.  The submenu appears.
The main screen for restart search appears as a pop-up window.
- (5) Set the position to restart search in the setting area.  Delimit the ONB number in the setting area using /.
<When O No. was attached>
The main or sub program is targeted.
(Ex.) 1000/6/0
<When O No. was not attached>
The program currently searched is targeted.
(Ex.) /6/0
(Note) When the **[INPUT]** key is pressed without entering data in the input area, restart search will be carried out for the last execution block. (Type 1 only)
- (6) Press the **[INPUT]** or **[Search exec]** menu.  Restart search is executed.
The message "In restart search" appears during the search process, and the message "Restart search complete" appears when completed.
Each axis' restart position and the restart remaining distance are displayed.
When the **[MSTB history]** menu is pressed, the MSTB history screen will open as a pop-up window, and the M, S, T, B command used in the machining program will be listed.

2.3.3 Executing Restart Search (Restart Type 2)

If a machining program differing from the machining program to be restarted was run with tape, memory or HD operation before starting restart search, restart the respective machining program with restart type 2.

The restart type 2 operation sequence is the same as restart type 1, but necessary matters for starting the machining program, such as setting the coordinate system, must be completed before starting restart search. When the parameter "#8914 Auto Top search" is "0", execute the top search for the machining program.

Operation method (When the parameter "#8914 Auto Top search" is "0")

(Example) When restarting from subprogram O123 N6 B2 called from main program O1000

- (1) Turn the power ON, and return all axes to the reference position.
 - (2) In the MDI mode, set the coordinate system to be used when starting the program to be restarted.
 - (3) Move each axis to the program restart position.
 - (4) When using tape operation, index the top of the tape.
 - (5) Press the main menu **[Restart search]**. → The submenu appears.
The main screen for restart search appears as a pop-up window.
 - (6) Press the **Type 2**.
 - (7) Press the sub-menu **[Top search]**. → The window for top search appears as a pop-up window.
 - (8) Using the **↑**, **↓**, **↖** and **↗** keys, move the cursor to the target machining program. → Set the cursor to 1000.
 - (9) Press the **INPUT** key. → The top search starts.
When the top search is completed, the message "Search Complete" appears.
The top search pop-up window closes, and the main screen for restart search appears as a pop-up window.
- The search can be executed by pressing the menu **[Search exec]** instead of the **INPUT** key.

- (10) Set the position to restart search in the setting area.



Delimit the ONBP number in the setting area using /.
<When O No. was attached>

The restart search is executed at designated position by NBP No. with the set O No. at the head.

(Ex.) 123.PRG/6/2/1

<When O No. was not attached>

The program currently searched is targeted.

(Ex.) /6/2/1

P sets the number of times that the block targeted for the restart search appears.

For example, if a block in a subprogram is searched, and the subprogram is called out several times, the block to be searched is also executed several times. Thus, which execution block to be searched must be set. (If "0" is set, it is handled in the same manner as "1".)

To search the first execution block, or to search for a block executed only once, this item does not need to be set.

- (11) Press the **INPUT** or **Search exec** menu.



Restart search is executed.

The message "In restart search" appears during the search process, and the message "Restart search complete" appears when completed.

Each axis' restart position and the restart remaining distance are displayed.

When the **MSTB history** menu is pressed, the MSTB history screen will open as a pop-up window, and the M, S, T, B command used in the machining program will be listed.

2.3.4 Returning to the Restart Position

The axis is returned to the restart position after restart search is completed.

The method for returning to the restart position (manual/automatic) can be selected with the parameters "#1302 AutoRP".

0 : Manual restart position return

1 : Automatic restart position return

Operation method (manual restart position return)

(1) Turn the restart switch ON.

(2) Enter the manual (JOG/rapid traverse) mode.

(3) Move the axis in the restart return direction.



The restart position and "RP" appear sequentially from the axes that have been returned. The Restart remaining distance is "0".

Restart pos	Remain dist
X1 40.000	X1 40.000
Y1 150.100	Y1 150.100
Z1 -70.000	Z1 -25.000
C1 0.000RP	C1 0.000

(4) When all axes have been returned, turn the restart switch OFF.

- (Note 1)** When the restart switch is ON, move the axis in the same direction as the restart direction. If moved in the reverse direction, the operation error "M01 R-pnt direction illegal" occurs. If the tool needs to be retracted once, such as if the tool is interfering with the workpiece, turn the restart switch OFF and retract the axis manually.
- (Note 2)** After restart position return is completed, the axis cannot be moved if the restart switch is ON. If the axis is moved, the operation error "M01 restart switch ON" occurs.
- (Note 3)** If even one axis has not completed return to the restart position at cycle start, the error "T01 Restart pos. return incomplete" occurs. Note that if the axis has been returned to the restart position once and is not at the restart position during cycle start, the alarm does not occur.
- (Note 4)** If the axis to be returned to the restart position is a machine lock axis, the operation error "M01 program restart machine lock" occurs. Release the machine lock before returning to the restart position.
- (Note 5)** If the restart switch is turned to ON after the axis is returned to the restart position with the restart switch OFF, "PR" may not be displayed. Return to the restart position after the restart switch is turned ON.

2.3.5 Executing the MSTB Commands

If the MSTB history menu is pressed after restart search is completed, the MSTB commands used for machining program appear.

When the cursor is moved to the listed M, S, T, B commands and the **[INPUT]** key is pressed, that command will be executed.

Up to 35 M commands, 3 commands each for S1 to S4, 3 T commands and 3 B commands are displayed. If many MSTB commands are used for machining, the MSTB commands used at first will not appear.

Operation method

- (1) Press the submenu **MSTB history**. → The pop-up window changes to the MSTB history window. The MSTB commands used for machining program are listed.
- (2) Using the **↑**, **↓**, **←** and **→** keys, move the cursor to the position of the data to set.
- (3) Press the **[INPUT]** key. → The designated command is executed. A value, which has been commanded once, is displayed in gray. The cursor will move to the next item.
- (4) Repeat steps (2) and (3).
- (5) When completed with all settings, press the **Close** or **MSTB history** menu. → The MSTB history pop-up window closes and the restart search main window appears as a pop-up window.

2. Monitor Screens

2.4 Program Edit

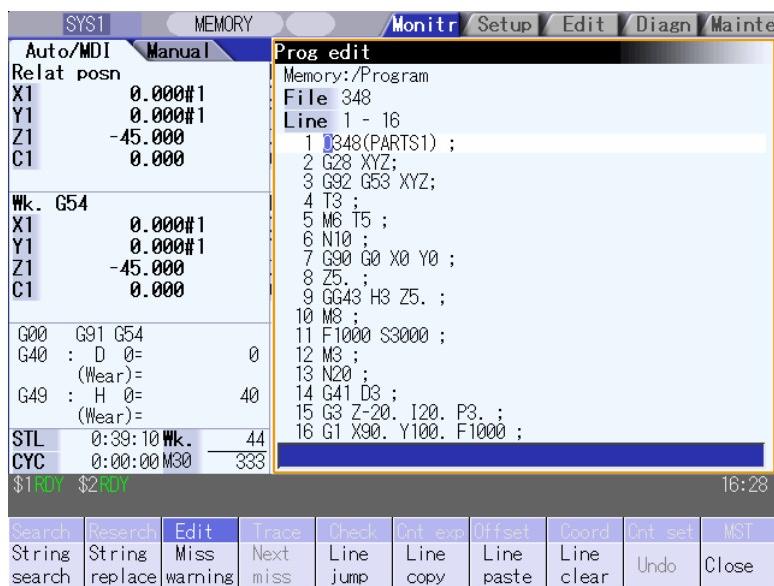
2.4 Program Edit

The machining programs are edited. When the main menu **Edit** is pressed, the operation searched program (MDI program for MDI mode) appears.

If no program has been searched or tape operation has been executed, the edit window will not open.

When the program is edited, the key input data is directly written into the program display area. All data is overwritten from the cursor position. "Editing" appears on the right side of the file name display when the input starts. When the **INPUT** key is pressed, the program is saved in the NC memory and the "Editing" message disappears.

Refer to "4.2 Program edit" for details.



2.5 Trace

This function illustrates the actual machine's movement path or tool center point movement path, and draws the actual machine movement.

This allows the machine operation to be monitored during machining.

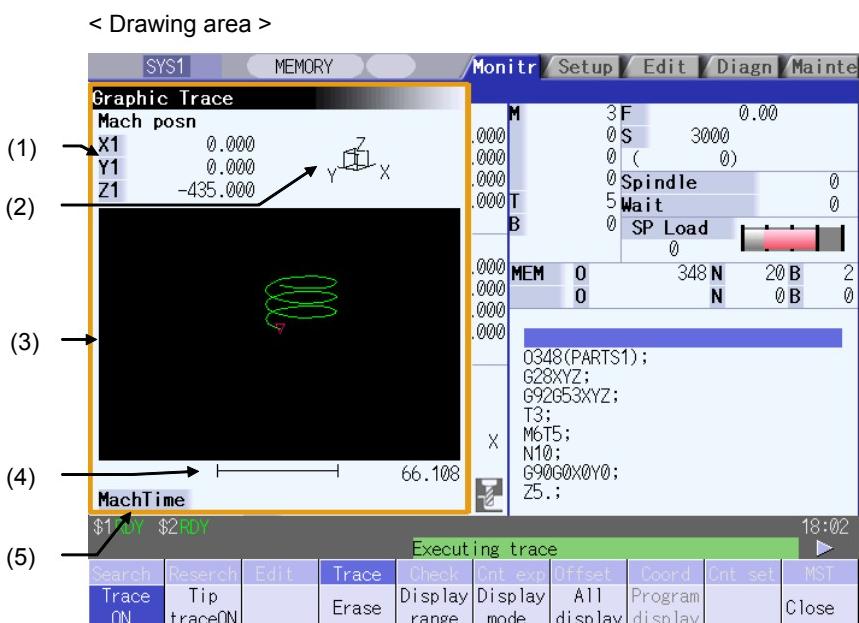
The programs that can be traced are operation searched machining programs (MDI program for MDI mode). If no program has been operation searched, the trace window will not open.

Using **All display** menu, normal display and whole display modes can be switched.

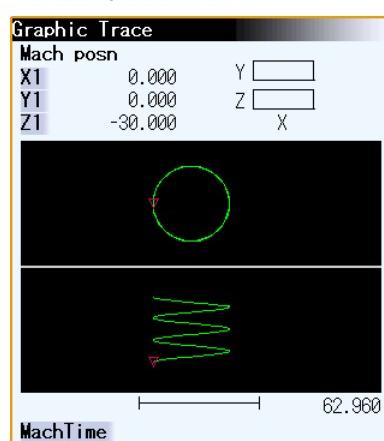
(Note 1) The trace function is an additional specification. The graphic trace option is required.

(Note 2) The tool center point trace function is an additional specifications. The 5-axis related options (tool center point control, tool axis direction tool length compensation, tool handle feed & interrupt) are required.

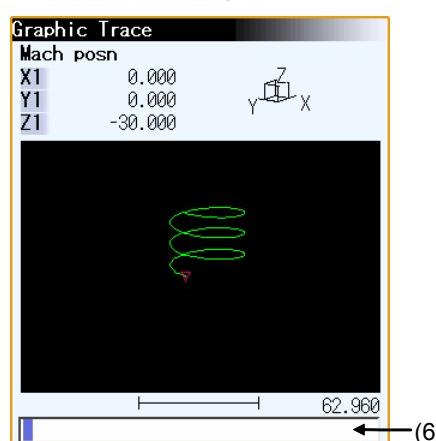
- Normal display (full-screen display mode is OFF)



< Drawing area: 2-plane >



< Input area displayed >



Display items

Display item	Details
(1) Counter	The counter of the axis targeted for the trace drawing is displayed. The three axes which are displayed are set with the parameters. [Trace] The machine position is displayed. [Tip trace] The machine position of the tool center point is displayed.
(2) Display mode	The plane currently being drawn is displayed.
(3) Trace drawing area	This area is used to draw the tool path as graphics. The zero point to be displayed can be switched between the machine position zero point and workpiece coordinate position zero point with parameter "#1231 set03".
(4) Scale	The display range scale is displayed.
(5) Machining time display	The time required for machining is calculated and displayed. Nothing is displayed during tracing.
(6) Input area	The input area appears when the menu Display range and Display mode are pressed. The scale value and display mode are set. The input area is hidden when the INPUT key is pressed.
(7) Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted.

Counter display conditions

	5-axis related specifications disabled	5-axis related specifications enabled
Machine position trace mode	Machine position	Machine position
Tool center point trace mode	-	Machine position of tool center point

Menus

Menu	Details	Type	Reference
Trace ON	This activates the machine position trace mode. If any program is currently running, the machine position path is traced from the current position. If this menu is pressed during the machine position trace mode, the trace mode will be turned OFF.	B	2.5.1 Displaying the Machine Position Trace
Tip traceON	This activates the tool center point trace mode. If any program is currently running, the path of tool center point machine position path is traced from the current position. If this menu is pressed during the tool center point trace mode, the trace mode will be turned OFF. Note that this menu does not appear if the 5-axis related option is OFF.	B	2.5.3 Displaying the Tool Center Point Trace
Erase	This erases the data in graphic drawing area displayed on the screen.	C	
Display range	This changes the graphic drawing display range. When this menu is pressed, the menu changes to the display range change menu. When the display range is changed, the graphic data displayed on the screen is erased.	C	2.5.5 Changing the Display Range
Display mode	This changes the drawing plane. When this menu is pressed, the menu changes to the display mode change menu. There are three types of graphic display modes: 1-plane, 2-plane and 3D. When the drawing plane is changed, the graphic data displayed on the screen is erased.	C	2.5.6 Changing the Display Mode
All display	This switches the normal display mode and the full-screen display mode.	B	2.5.8 Switching the Full-screen Display Mode
Program display	This displays the machining program being executed on the graphic drawing area. This menu can be selected only when the full-screen display mode is applied.	B	
Rotate	This sets the viewpoint angle for the 3D display mode. When the viewpoint angle is changed, the graphic data displayed on the screen is erased. Note that this menu can be used only in the 3D display mode.	C	2.5.7 Changing the Display Angle
Std range	The display range (scale and display position) is automatically set from the machine movable area. The machine movable area is set with the parameters "#2013 OT-" and "2014 OT+" (software limit). When the display range is changed, the graphic data displayed on the screen is erased.	C	
Close	This closes the pop-up window and quits this function.	C	

2.5.1 Displaying the Machine Position Trace

Operation method

(1) Press the **MONITOR** key

(2) Press **SEARCH** for machining program

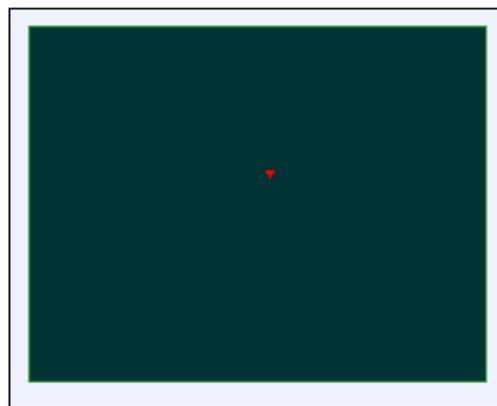
(3) Press the main menu **Trace ON**.

(4) Press **CYCLE START** button.

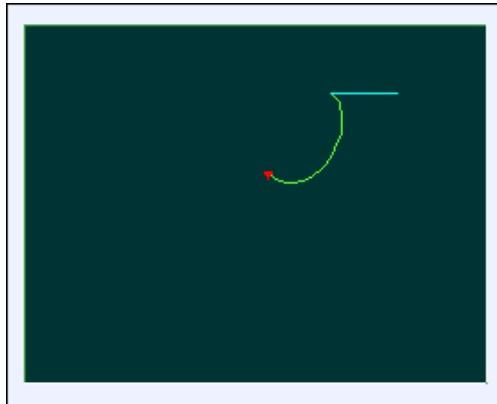
- The **Trace ON** menu is highlighted.
If **Tip TraceON** is highlighted, unhighlight it.
- The machine position appears in the drawing area as a tool mark.
- The machine position counter is displayed at the counter.
- The message "Tracing" appears.

After this, the machine position path is drawn with graphics in the machine position trace mode.

(Note) If graphic check (2D) is executed, the "Trace ON" status is cancelled.



The machine position path is drawn with graphics.



The machine position path is drawn with a solid green line.

2.5.2 Canceling the Machine Position Trace

Operation method

- (1) Start tracing with the machine position.
- (2) Press the main menu **Trace ON**.



- The **Trace ON** menu is unhighlighted.
- The tool mark in the drawing area is erased.
- The message "Tracing" is erased.

2.5.3 Displaying the Tool Center Point Trace

Operation method

- (1) Press the main menu **Tip TraceON**.



- The **Tip TraceON** menu is highlighted.
If **Trace ON** is highlighted, unhighlight it.
- The tool center point appears in the drawing area as a tool mark.
- The tool center position is displayed at the counter.
- The message "Tracing Tip Position" appears.

After this, the tool center point path is drawn with graphics in the tool center point trace mode.

(Note) If graphic check (2D) is executed, the "Tip Trace ON" status is cancelled.

2.5.4 Canceling the Tool Center Point Trace

Operation method

- (1) Start tracing with the tool center point.
- (2) Press the main menu **Tip TraceON**.



- The **Tip TraceON** menu is unhighlighted.
- The tool mark in the drawing area is erased.
- The message "Tracing Tip Position" is erased.

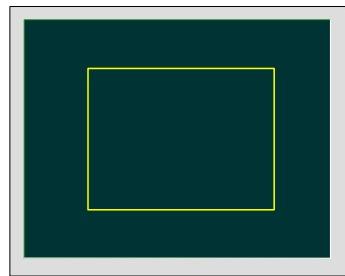
2.5.5 Changing the Display Range

The graphic drawing's scale can be enlarged or reduced, and the position moved or centered.

Operation method (Enlarging the and reducing the drawing)

- (1) Press the **Display range** key. → A white frame indicating the display range appears on the screen.
The display range input mode is activated, and the following menu appears.
- | | | | | | | | | | |
|---------|----------|----|------|------|-------|------------|--|--|--|
| Zoom in | Zoom out | Up | Down | Left | Right | Center-ing | | | |
|---------|----------|----|------|------|-------|------------|--|--|--|
- (2) Press the menu **Zoom in** or **Zoom out**. → The size of the white frame changes according to the key operations.
- To enlarge the figure:
Press the menu **Zoom In** or the **-** key.
- To reduce the figure:
Press the menu **Zoom out** or the **+** key.
- A solid-line frame appears with respect to the original scale when enlarging, and a dotted-line frame appears when reducing.
- (3) Press the **INPUT** key. → The display scale is changed.
By changing the display scale, the graphic data displayed on the screen is erased.
It is also possible to change the display scale by setting a scale value in the input area.

(Note) The changed scale value is held even after the power is turned OFF and ON.



2.6 Program Check (2D)

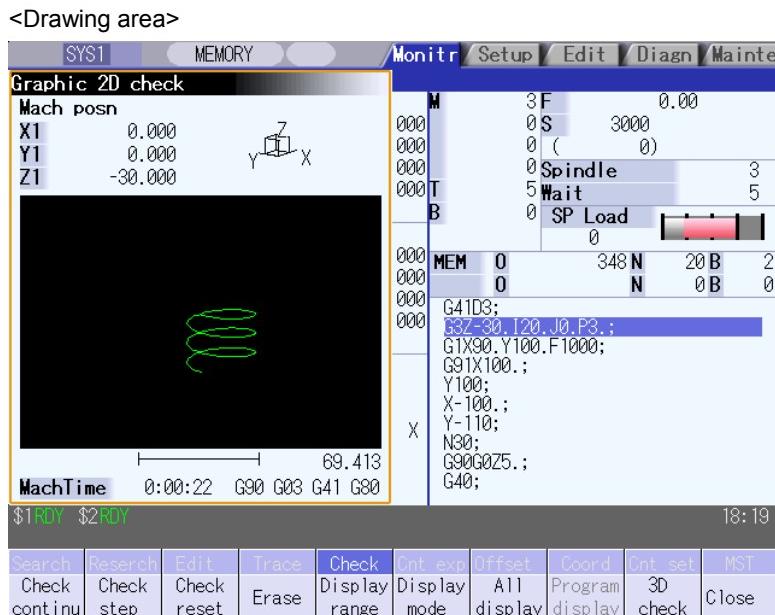
Program check (2D) is a function that draws the machining program movement path without executing automatic operation. The machining program can be checked with graphic data drawn at a high speed.

The programs that can be checked are operation searched machining programs (MDI program for MDI mode).

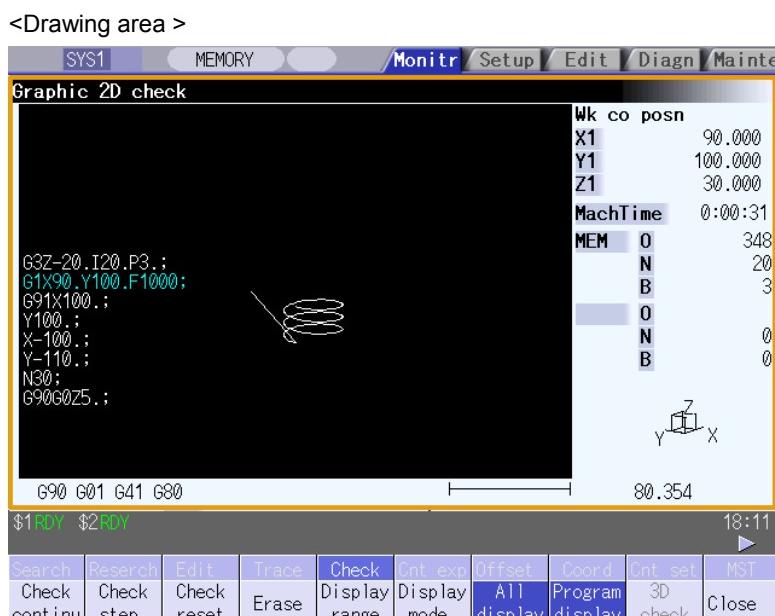
If no machining program has been operation searched, the program check window will not be opened. Refer to "4.3 Program Check (2D)" for details.

(Note) The program check (2D) function is an additional specification. The graphic check option is required.

■ Normal display (full-screen display mode is OFF)



■ Full-screen display (full-screen display mode is ON)



2.7 Program Check (3D)

Program check (3D) is a function that draws the workpiece shape and tool movement in the cutting process of the machining program as a solid image without executing automatic operation. The machining program can be checked with graphic data drawn at a high speed.

The operation searched machining program (MDI program for MDI mode) can be checked.

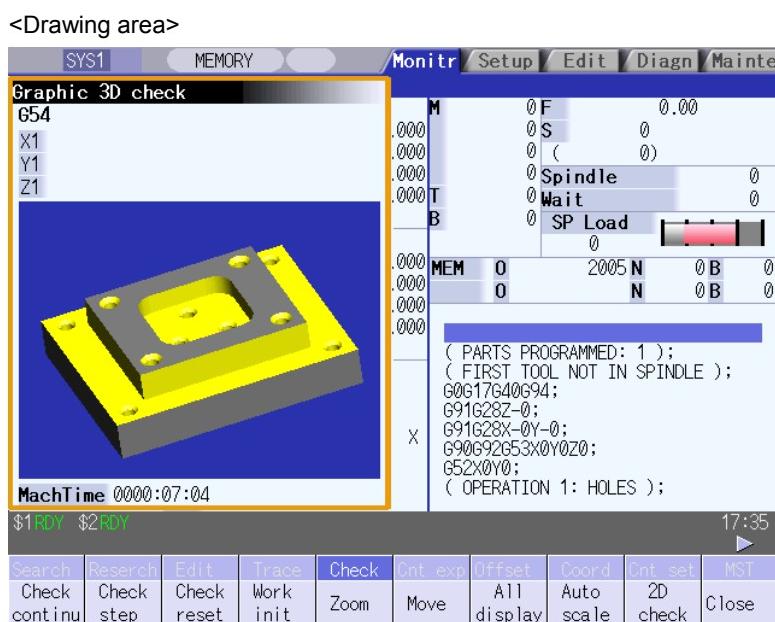
The Program Check window will not open if no machining program has been searched.

The workpiece shape and tool shape used with this function can be set on the Edit screen.

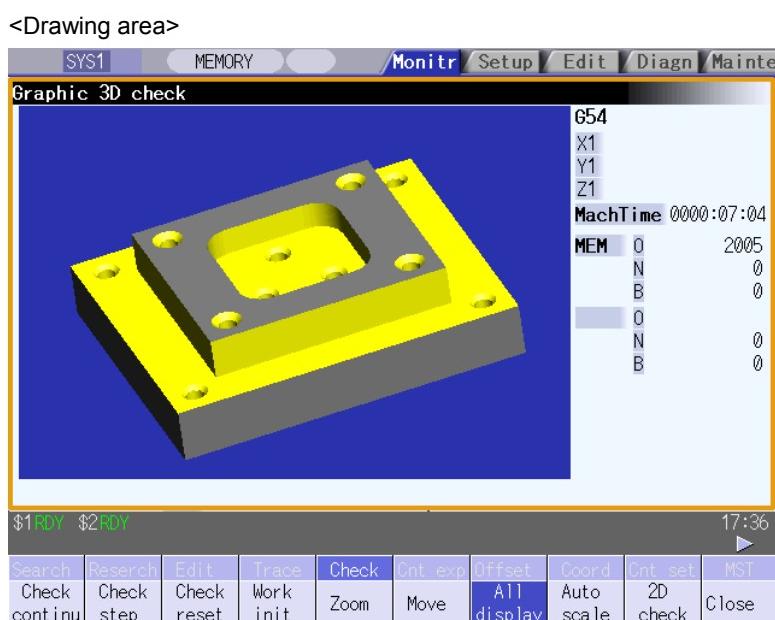
Refer to section "4.4 Program Check (3D)" for details.

(Note) The program check (3D) function is an additional specification. The graphic check and 3D solid graphic check options are required.

- Normal display (full-screen display mode is OFF)



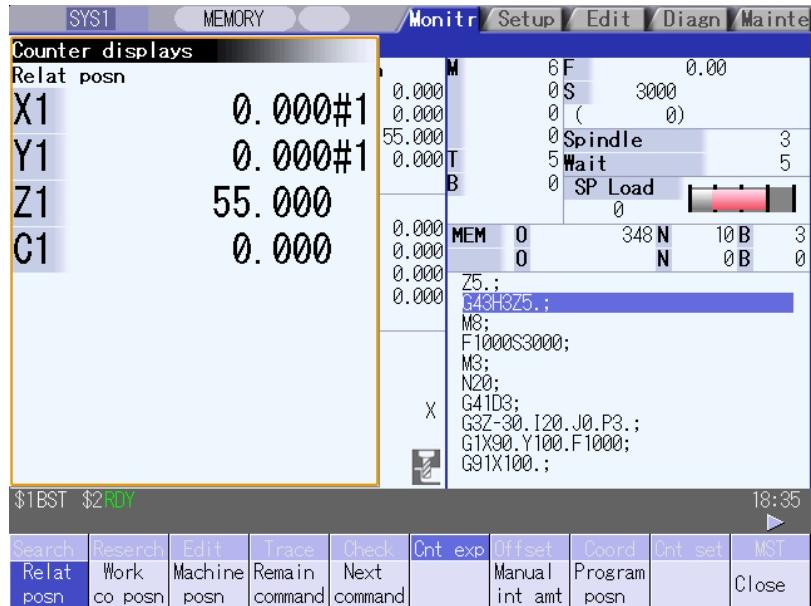
- Full-screen display (full-screen display mode is ON)



2.8 Counter All-axis Display

A counter for all axes opens as a pop-up display.

The type of displayed counter can be selected with the menu.



Menus

Menu	Details	Type
Relat posn	This displays the currently executed position	B
Work co posn	This displays the G54 to G59 workpiece coordinate system modal No. and the workpiece coordinate position in that workpiece coordinate system.	B
Machine posn	This displays the coordinate position of each axis in the basic machine coordinate system having a characteristic position, specified by the machine, as a zero point.	B
Remain command	This displays the remaining distance of the movement command being executed during automatic start or automatic halt. (The remaining distance is the incremental distance from the current position to the end point of that block.)	B
Next command	This displays the details of the command in the block executed after the block currently being executed.	B
Manual int amt	This displays the amount moved with the manual mode while the manual absolute switch was OFF.	B
Program posn	This displays the value obtained by subtracting the tool compensation amount compensated for that axis from the position actually being executed for each axis.	B
Close	This closes the pop-up window and quits this function.	C
Tip wk posn	This displays the position of the tool end from the workpiece coordinate reference point in the selected workpiece coordinate system.	B
Tip machine	This displays the position of the tool end from the machine coordinate system reference point in the machine coordinate system.	B
Pulse	This displays the amount moved in the selected axis direction using the manual pulse generator in the hypothetical machine coordinate system. Basically this is updated only when manual ABS is OFF. If "#7905 NO_ABS" is set to "1", this will be updated regardless of the manual ABS ON/OFF.	B

(Note 1) The type of counter displayed first when the pop-up display appears is the relative position. If the 5-axis related option is ON, the counter will be the "Tip wk posn".

The counter which appears next is the type selected previously.

(Note 2) The menus [Tip wk posn], [Tip machine] and [Tip axis movement] appear when the 5-axis related option is ON.

2. Monitor Screens

2.9 Tool Compensation Amount

2.9 Tool Compensation Amount

The tool compensation data can be set and displayed.

The tool compensation data screen configuration differs according to the tool compensation type.

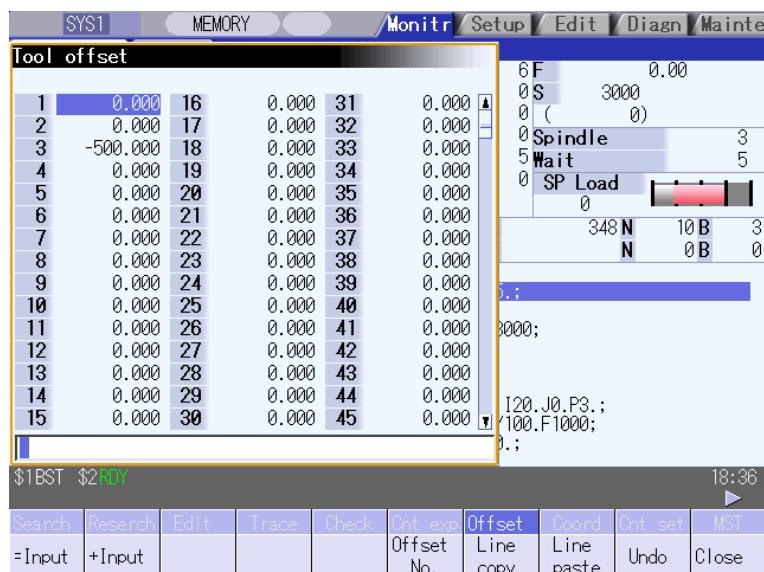
The number of tool compensation sets to be set or shown differs according to the option.

Refer to section "3.2 Tool Compensation Amount" for details.

[Tool compensation type I (M system)] Parameter "#1037 cmdtyp" = 1

The combined amount of the shape compensation and wear compensation are set as the compensation data, with no distinction between shape compensation memory and wear compensation memory. (The tool compensation data is the shape compensation amount + wear compensation amount.)

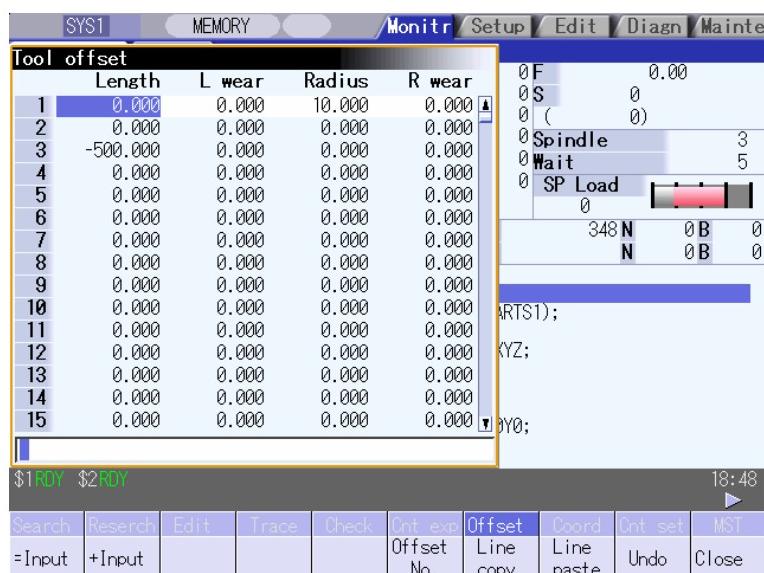
The compensation data is used commonly for the tool length compensation, tool position offset, tool radius compensation, and three-dimensional tool radius compensation.



[Tool compensation type II (M system)] Parameter "#1037 cmdtyp" = 2

The shape compensation amount and wear compensation amount are set separately. The shape compensation amount is furthermore divided into length and radius dimensions.

Of the compensation data, the length dimension data is used for the tool length compensation and tool position offset, and the radius dimension data is used for the tool radius compensation and three-dimensional tool radius compensation.



2. Monitor Screens

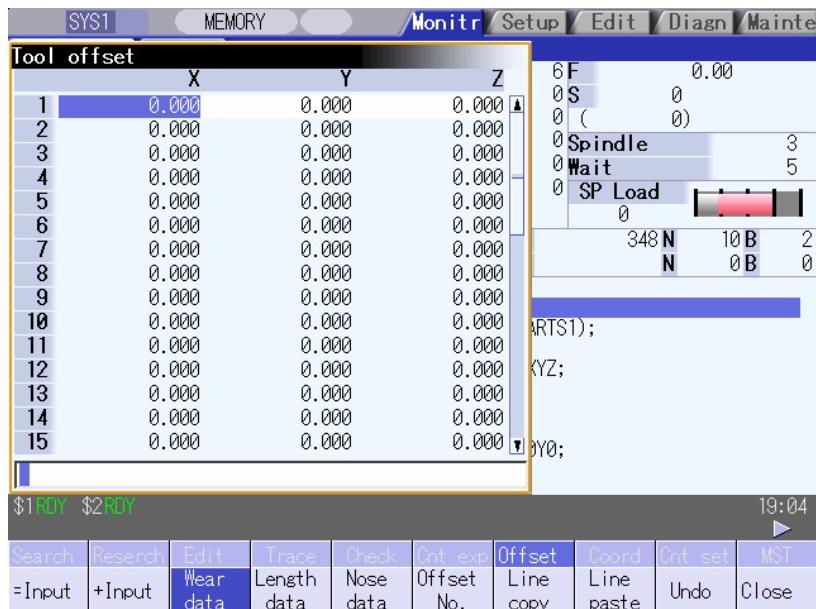
2.9 Tool Compensation Amount

[Tool compensation type III (L system)] Parameter "#1037 cmdtyp" = 3

The wear data, tool length data and tool nose data are set separately. These are changed with the sub-menu.

(a) Wear data

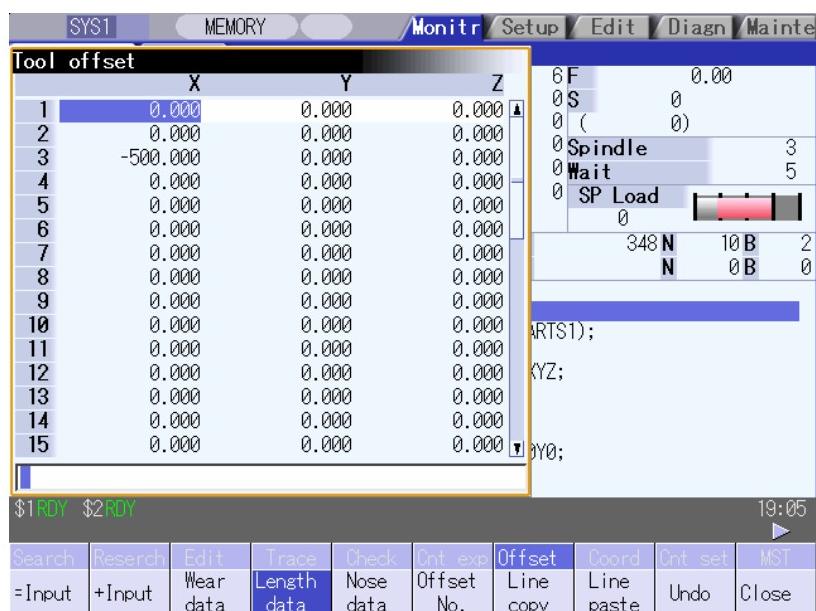
Set the tool nose wear amount for each tool used. When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the tool length data and tool nose data.



(b) Tool length data

Set the tool length in respect to the program basic position of each tool used.

When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the wear data and the tool nose data.

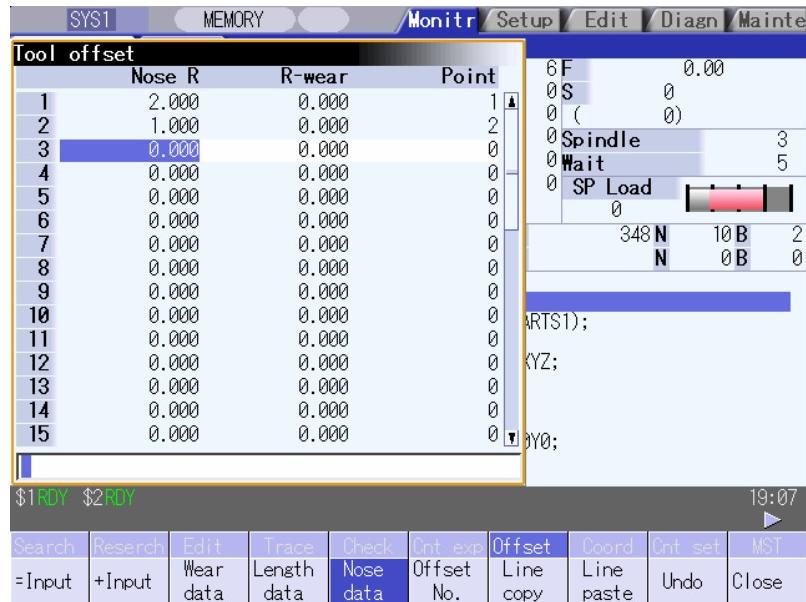


2. Monitor Screens

2.9 Tool Compensation Amount

(c) Tool nose data

Set the tool nose radius value (tool nose R), wear radius value (R wear) and tool nose point (tool nose point P) of the tool nose mounted on the tool for each tool used. When the tool offset No. is designated by the tool command (T command), offset is carried out matching the tool length data and tool nose data.



CAUTION

If the tool offset amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in the next block or after several subsequent blocks.

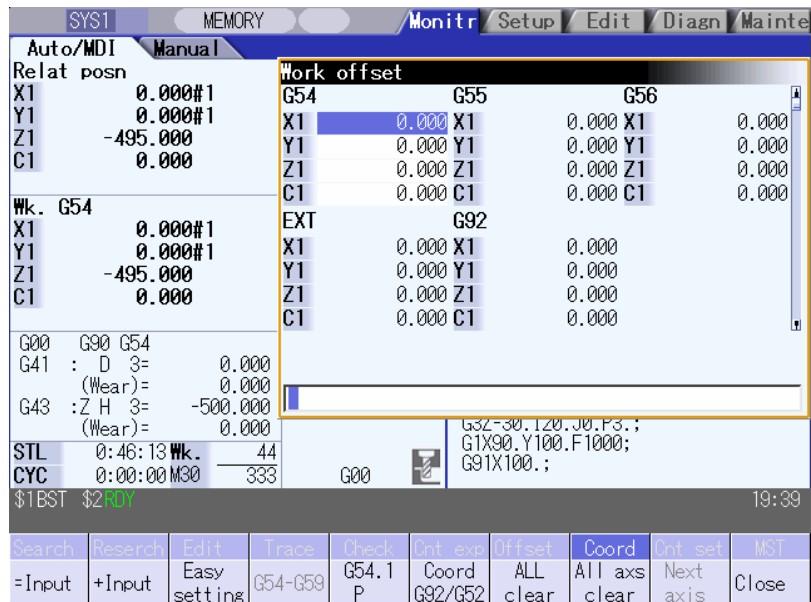
2.10 Workpiece Coordinate System Compensation

The coordinate system offset controlled by the NC can be set and displayed.

48 or 96 sets of coordinate system offset sets can be added according to the option.

Refer to "3.6 Workpiece Coordinate System Offset" for details.

(Note) The G92/G52 coordinate system offset cannot be set.



CAUTION

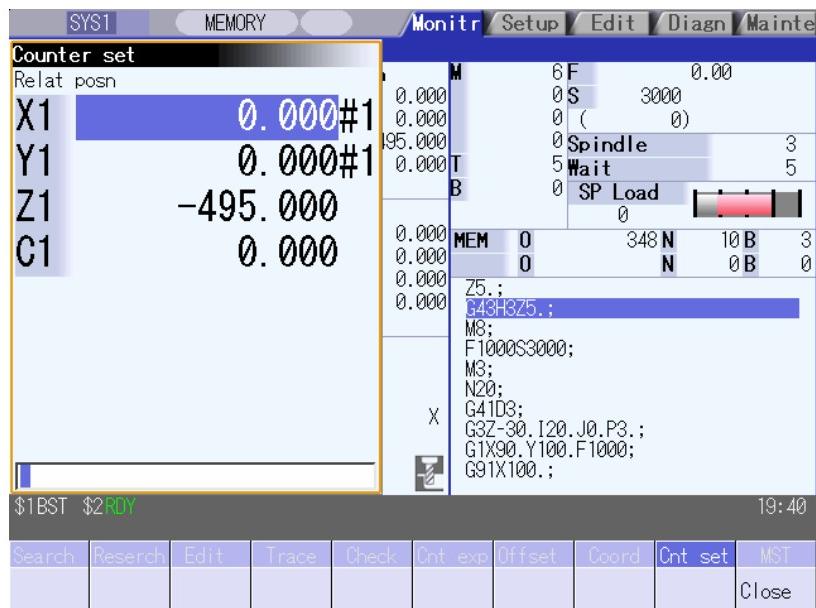
If the tool offset amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in the next block or after several subsequent blocks.

2. Monitor Screens

2.11 Counter Set

2.11 Counter Set

An arbitrary value can be set in the relative position counter which opens as a pop-up window.



Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

Operation method

(1) Press the main menu [Counter set].



The relative position counter opens as a pop-up window.
The cursor appears at the No. 1 axis of the relative position counter.

Relat posn

X1	0.000#1
Y1	0.000#1
Z1	-495.000
C1	0.000

Instead of the operation above, the axis name address key can be pressed to set the counter.

(Example) [Z]



The relative position counter opens as a pop-up window.
The cursor appears at the designated axis (Z axis).

Relat posn

X1	0.000#1
Y1	0.000#1
Z1	-495.000
C1	0.000

(2) Input a numeric value.

(Example) 100.000 [INPUT]



The set value "100.000" appears at the cursor position. The cursor moves to the next axis.

Relat posn

X1	100.000#1
Y1	0.000#1
Z1	-495.000
C1	0.000

(3) Repeat step (2) for each axis.



The pop-up window closes when the counter has been set for the last axis.

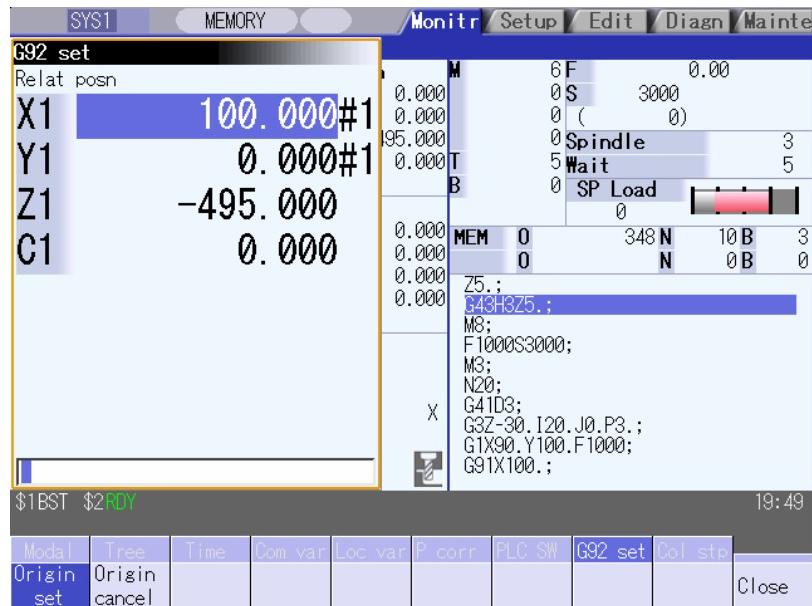
For axes that are not to be operated, press the [↓] key and move the cursor.

2. Monitor Screens

2.12 Origin Set, Origin Cancel

2.12 Origin Set, Origin Cancel

Origin set and origin cancel can be executed.



Menus

Menu	Details	Type	Reference
Origin set	The origin is set. When main menu [G92 set] is pressed, the menu [Origin set] is highlighted and the origin set mode is activated.	A	
Origin cancel	The origin is canceled. The origin cancel mode is activated when this menu is pressed.	A	
Close	This closes the pop-up window and quits this function.	C	

Differences between origin set and origin cancel

	Origin set	Origin cancel
Function	The coordinate system is shifted so the current position becomes the designated position of the workpiece coordinate system. This is equivalent to "G92 X0". (When X is the target axis.)	The coordinate system is shifted so the zero point of the workpiece coordinate system matches the zero point of the basic machine coordinate system. This is equivalent to "G92 G53 X0". (When X is the target axis.)
Changes in the counter value	The relative position counter and workpiece coordinate counters become "0".	The relative position counter matches the machine coordinate counter.
Offset	The G92 shift amount is updated.	The G92 shift amount and the G52 shift amount for the G54 to G59 coordinate system becomes "0".

Operation method (Setting the origin)

- (1) Press the main menu [G92 set].



The relative position counter opens as a pop-up window. The menu [Origin set] is highlighted. The cursor appears at the No. 1 axis of the relative position counter.

Relat posn	
X1	90. 000
Y1	100. 000
Z1	-530. 000
C1	0. 000

- (2) Input 0, and then press the [INPUT] key.



If the [INPUT] key is pressed without inputting a value, zero (0) will be set. (Origin zero)

"0.000" appears at the cursor position. The cursor moves to the next axis.

Relat posn

X1	0. 000
Y1	100. 000
Z1	-530. 000
C1	0. 000

- (3) Repeat step (2) for each axis.



The pop-up window closes when the origin has been set for the last axis.

For axes that are not to be operated, press the [↓] key and move the cursor.

(Note) An error will occur if a value other than 0 is set.

Operation method (Canceling the origin)

- (1) Press the main menu [G92 set], and then press the menu [Origin cancel].



The relative position counter opens as a pop-up window. The menu [Origin cancel] is highlighted. The cursor appears at the No. 1 axis of the relative position counter.

- (2) Press the [INPUT] key.



The same value as the machine position appears at the cursor position. The cursor moves to the next axis.

- (3) Repeat step (2) for each axis.



The pop-up window closes when the origin has been canceled for the last axis.

For axes that are not to be operated, press the [↓] key and move the cursor.

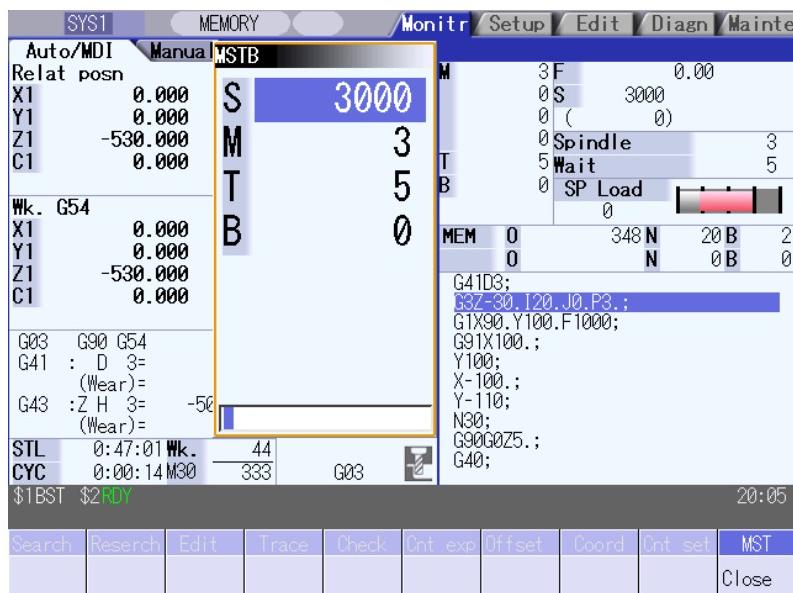
2. Monitor Screens

2.13 Manual Numerical Value Command

2.13 Manual Numerical Value Command (MST Code)

The spindle function (S), miscellaneous function (M), tool function (T) and 2nd miscellaneous function (B) commands can be executed.

The manual numerical value command can be executed by inputting an address such as S, M, T or B, as well.



Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

Operation method (Executing T31 with a manual numerical value command)

- (1) Press the main menu **MST**. → The S, M, T, B display opens as a pop-up window.

S	100
M	50
T	4
B	1000

- The manual numerical value command can also be issued by using the address keys instead of the operation above.
(Example) **T** → The S, M, T, B display opens as a pop-up window. The cursor appears at T.

S	100
M	50
T	4
B	1000

- (2) Using the **↑** and **↓** keys, move the cursor to the position to be set. → The cursor moves.

- (3) Input a value.
31 **INPUT** → The input value is set.

Operation method (Canceling the manual numerical value command)

The manual numerical value command mode is canceled by carrying out one of the following operations before pressing the **INPUT** key.

- Press the menu **Close**
- Press the  key
- Change the screen

Setting/output range of manual numerical value command

The manual numerical value command setting range is shown below.

	BCD	Signed binary
S	-	-99999999 to 99999999
M	0 to 99999999	-
T	0 to 99999999	-
B	0 to 99999999	-

- Add a "-" sign before the value to set a negative value. The display will be a positive value.
- A value larger than "#3001 slimt1" to "#3004 slimt4" or "#3005 smax1" to "#3008 smax4" cannot be output for S.

2. Monitor Screens

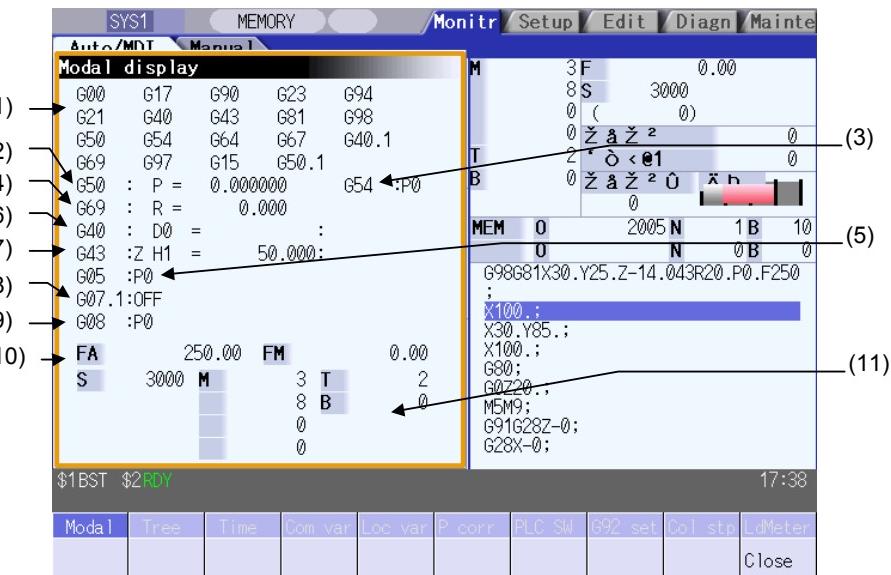
2.14 Modal Display

2.14 Modal Display

The state of each modal during automatic operation is displayed.

The displayed details differ for the M system and L system.

<M system>



Display items

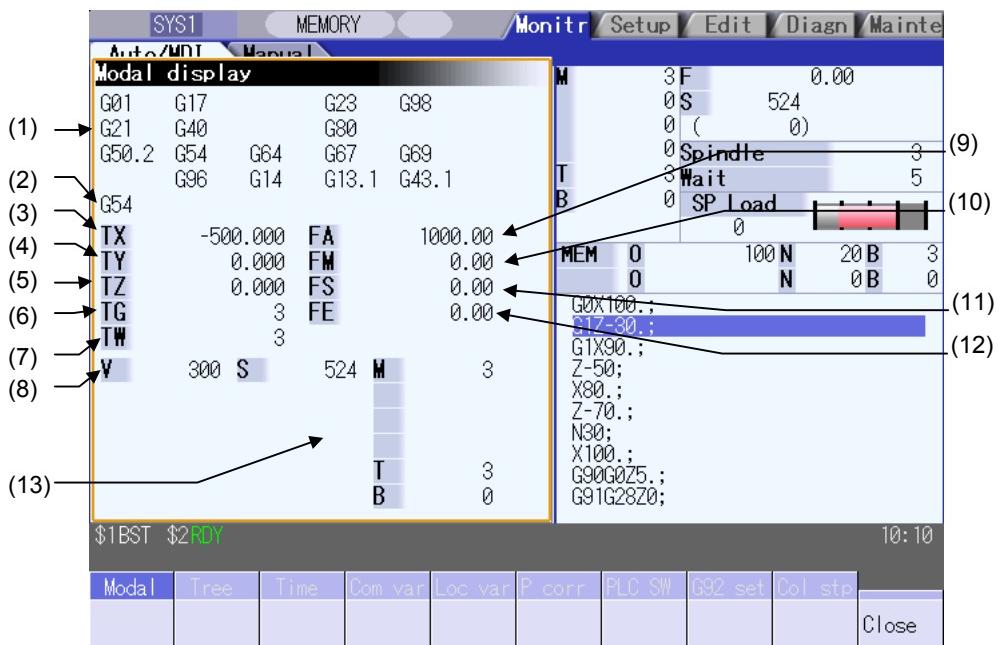
This displays each modal state.

Display item	Details
(1) G00...G94 : G69...G42.1	Status of currently executed G command modal
(2) G50:P=0.000000	Scaling magnification
(3) G54.1:P0	Extended workpiece coordinate system
(4) G69:R=0.000	Coordinate rotation angle (Displays within a ±360° range)
(5) G05:P0 Q1 Q2 P10000S P10000 P1 P2	High-speed machining mode High-speed high-accuracy control 1 Spline interpolation High-speed high-accuracy control 2 (SSS control ON) High-speed high-accuracy control 2 (SSS control OFF) High-speed machining mode I High-speed machining mode II
(6) G40: D0 = 100.000000: 10.000000	Tool radius compensation modal Compensation No. Shape compensation amount in respect to tool radius Tool radius wear amount
(7) G49: Z H0 = 0.000000: 0.000000	Tool length compensation modal Compensation axis name Compensation No. Compensation amount Tool length wear amount
(8) G07.1:OFF	Cylindrical interpolation modal
(9) G08: P0 P1	High-accuracy control mode High-accuracy control mode OFF High-accuracy control mode ON
(10) FA FM	F modal value of currently executed program command Manual federate
(11) S1 to S4 M1 to M4 T1 to T2 B	Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command

2. Monitor Screens

2.14 Modal Display

<L system>



Display items

This displays each modal state.

Display item	Details
(1) G01...G94 : G69...G42.1	Status of currently executed G command modal
(2) G54.1:P10	Extended workpiece coordinate system
(3) TX : -12.345	The total value of the first axis' tool length and wear compensation amount for the tool being used
(4) TZ : 12.345	The total value of the second axis' tool length and wear compensation amount for the tool being used
(5) TY : 10.000	The total value of the additional axis' tool length and wear compensation amount for the tool being used
(6) TG : 123	Tool length compensation No.
(7) TW : 123	Wear compensation No.
(8) V 12345678	Modal value for constant surface speed spindle rotation speed (V1 to V4)
(9) FA 24000.00	F modal value of currently executed program command
(10) FM 1200.00	Manual federate
(11) FS 0.0000	Program command synchronous feedrate modal value
(12) FE 0.0000	Thread lead command synchronous feedrate modal value
(13) S1 to S4 M1 to M4 T1 to T2 B	Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command

(Note) Fixed cycle programs

When a fixed cycle command is executed, the G command in the fixed cycle subprogram is not affected by the G modal in the called program.

Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

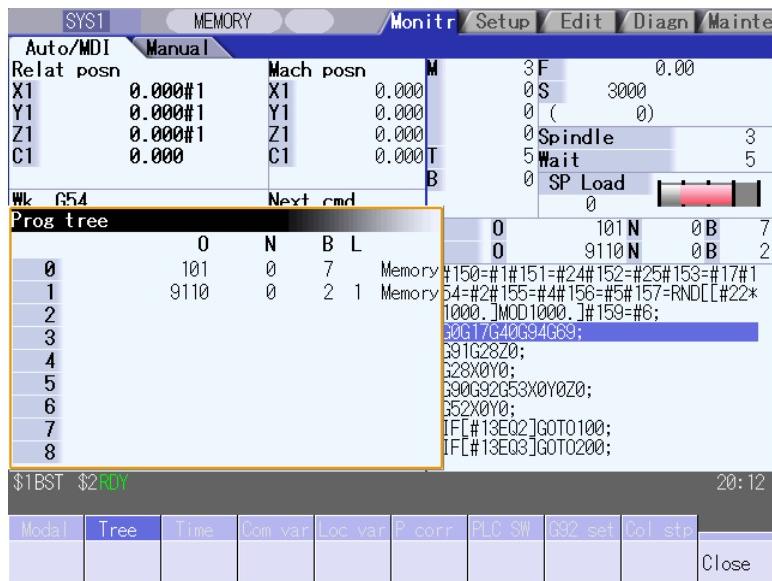
(Note) The menu is common for the M system and L system.

2. Monitor Screens

2.15 Program Tree Display

2.15 Program Tree Display

This displays the main program, subprogram, MDI interrupt and user macro call nesting structure.



Display items

Display item	Details
(1) 0	Program No. (0 to 15 characters) If the program No. (program name) exceeds 15 characters, "*" will appear at the 15th character.
(2) N	Sequence No. (0 to 99999)
(3) B	Block No. (0 to 99999)
(4) L	Remaining number of subprogram repetitions (0 to 99)
(5) Mode	Operation mode (0 to 7 characters)
(6) Main	Main program
(7) 1 to 8	Called subprogram, user macro call and MDI interrupt

Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

2. Monitor Screens

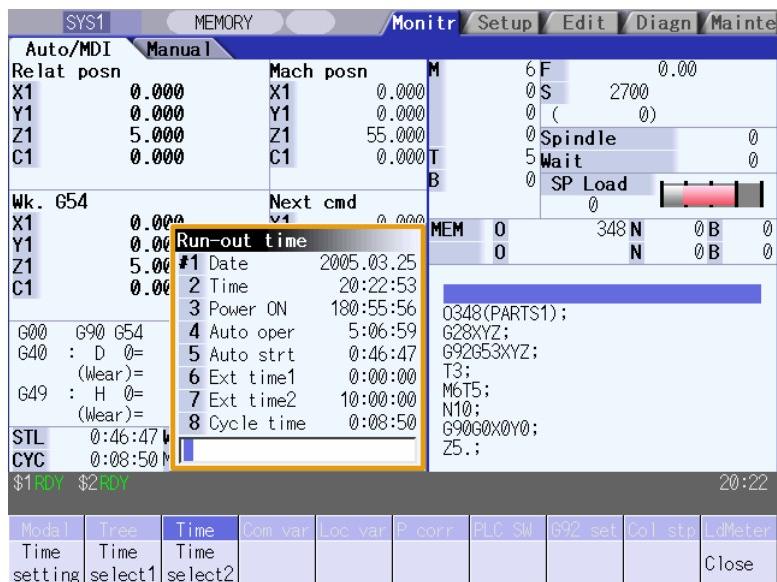
2.16 Integrated Time Display

2.16 Integrated Time Display

The integrated time (date, time, power ON time, automatic operation time, automatic start time, external integrated time 1, external integrated time 2, cycle time) controlled by the NC can be set and displayed.

Note that the cycle time cannot be set. (Cycle time is display only.)

The integrated times displayed in cycle time display area on "Auto/MDI" tag can be set.



Display items

Display item	Details
(1) #1 Date	The current date set in the NC is displayed. Year: 4 digits, Month: 2 digit, Date: 2 digit (YYYY.MM.DD)
(2) 2 Time	The current time set in the NC is displayed with the 24-hour system. (HH:MM:SS)
(3) 3 Power ON	This displays the total integrated time of the time from NC power ON to OFF.(HH:MM:SS)
(4) 4 Auto oper	This displays the total integrated time of the work time from automatic start button pressing in the memory (tape) mode to M02/M30 or reset button pressing (HH:MM:SS)
(5) 5 Auto strt	This displays the total integrated time during automatic starting from automatic start button pressing in the memory (tape) mode or MDI to feed hold stop, block stop, or reset button pressing. (HH:MM:SS)
(6) 6 Ext time1	This content differs depending on machine tool builder specification.
(7) 7 Ext time2	This content differs depending on machine tool builder specification.
(8) 8 Cycle time	This displays the time that automatic operation is started from when the automatic start button is pressed in the memory (tape) mode or MDI to when feed hold stop or block stop is applied or the reset button is pressed.

Menus

Menu	Details	Type	Reference
Time setting	This sets the integrated time.	A	2.16.1 Setting the Integrated Time
Time select1	The time that is displayed in upper line on cycle time display area is selected.	C	2.16.2 Setting the Time Display Selection
Time select2	The time that is displayed in bottom line on cycle time display area is selected.	C	
Close	This closes the pop-up window and quits this function	C	

2.16.1 Setting the Integrated Time

Operation method

- (1) Press the menu [Time setting]. → The time setting mode is entered.
The cursor appears at the "#1 Date" position in the integrated time display.
- (2) Input today's date.
(Example) 2003/8/19 [INPUT] → "2003.08.19" appears at "#1 Date", and the cursor moves to "#2 Time".
- (3) Set the data for each item, and press the [INPUT] key. → When "#7 External integrated time 2" has been set, the cursor disappears, and the time setting menu highlight is turned OFF.
- If the item does not need to be set, press the key and move the cursor.
Note that #8 Cycle time cannot be set, so the cursor will not move.

(Note 1) The data delimiters are as shown below.

Item	Valid delimiters during setting	Delimiters in display
#1 Date	". ." or "/ "	". ."
#2 Time to #7 Ext time2		
#8 Cycle time		

(Note 2) If the [Time setting menu] or key is pressed again during the time setting mode, the time setting mode will be canceled.

Setting range

Display item	Range
#1 Date	1980.1.1 to 2069.12.31
2 Time	00:00:00 to 23:59:59
3 Power ON	
4 Auto oper	
5 Auto strt	00:00:00 to 59999:59:59
6 Ext time 1	
7 Ext time 2	

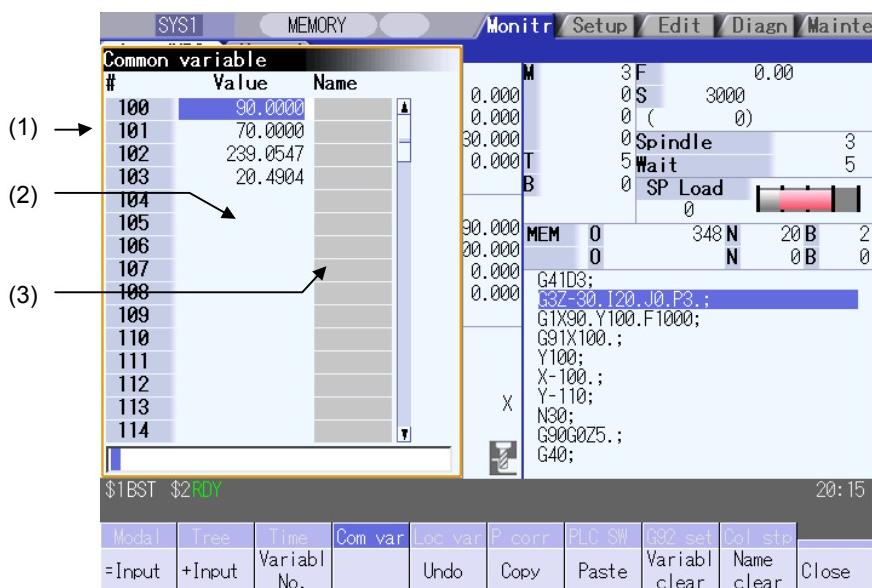
2.17 Common Variables

The details of the common variables can be set and displayed on this screen.

If there is a common variable command (Note) in the machining program, the variable value (variable name) set when the block is executed is displayed.

The number of common variable sets differs according to the specifications.

(Note) The variable names can be set for common variables #500 to #519.



Display items

Display item	Details
(1) Variable No.	This is the common variable No. There are address #100 and address #500 variables. The #100 variables appear at the head when the power is turned ON. If "#1052 MemVal" is set to "1" (Designate No. of common variable for common part system), "*" is attached to the part system common variable. (Note that if there is only one part system, "*" will not appear.)
(2) Variable value	The setting range is -999,999,999 to 999,999,999 or blank. An exponential is displayed when a 7 digits are set in the integer section and 5 digits or more are set in the decimal section. (Example) 1234567 → 1.2346E+006, 0.00001 → 1.0000E-005 The minimum setting unit that can be set is 1.0000E-099 (99 digits below decimal point). (Note) When the setting is "blank", the setting will be handled as "0" in the calculations. However, when the conditional expressions EQ or NE are used, the blank will not be handled as "0".
(3) Variable name	A variable name can be assigned for #500 to #519. Up to seven alphanumeric characters, starting with an alphabet character, can be set for the variable name.

Menus

Menu	Details	Type	Reference
=Input	This executes an absolute input.	C	2.17.1 Setting Common Variables
+Input	This executes an addition input.	C	
Variabl No.	This designates the variable No. to be displayed at the head.	A	
Undo	This returns the last rewritten data to its original value. This menu key is valid for "Data Input", "Paste" and "Undo" operations. Note that return to the original value is not possible after variable clear and comment clear operations.	C	
Copy	This copies the variable value and variable name at the cursor position.	A	2.17.2 Copying/Pasting Common Variables
Paste	This pastes the copied variable value and variable name.	C	
Variabl clear	This clears the contents of the variable No. at the cursor position or continuous variable Nos. (Note) The contents are not cleared to "0". The state with no data is entered.	A	2.17.3 Erasing Common Variables
Name clear	This clears the variable No. at the cursor position or the continuous variable number's variable name (Variable name: variable No. 500 to 519).	A	
Close	This closes the pop-up window and quits this function.	C	

2.17.1 Setting Common Variables

Operation method (Setting "135.000" in variable No. 102)

- (1) Press the menu [Variabl No.] → The menu is highlighted.
- (2) Designate the variable No.
102 [INPUT] → The common variable for the set No. appears at the head.
The cursor can be moved to 102 using the
[\uparrow], [\downarrow], [\blacktriangleup] and [\blacktriangledown] keys.
- (3) Input a value.
135 [INPUT] → The set value appears.
The value can also be set by pressing the
menu [=INPUT] instead of the [INPUT]
key.
The value can also be input as an
exponential.
(1.35E2 [INPUT] or 1.35E2 [=INPUT].)

Operation method (Adding "1.234" to variable No. 102)

- (1) Select common variable 102 with the
same procedure as steps (1) and (2)
above.
- (2) Input a value.
1.234 [+INPUT] → The value obtained by adding the input value to the original
value appears.
(Example) If the original value is 135.000, 136.234
appears. ($135.000 + 1.234 = 136.234$)

Operation method (Setting "COUNTER" as the variable name for variable No. 509)

- (1) Select common variable 509 with the
same procedure as steps (1) and (2)
above. → The cursor appears at the cursor 509 variable position.
- (2) Press the [\rightarrow] key. → The cursor moves to the 509 variable name.
- (3) Input the variable name.
COUNTER [INPUT] → "COUNTER" appears.

(Note) The variable name can be set only for variable Nos. 500 to 519.

2.17.2 Copying/Pasting Common Variables

Operation method

(1) Select the variable to be copied. → The cursor moves to the selected variable.

One of the following methods can be used to select the variable.

- Using the cursor movement keys
↓ and ↑, move the cursor to the variable to be selected.
- Press Variabl No. and set the variable No. in the input area, and press the INPUT key.

(2) Press the menu Copy. → One line of the copied variable is highlighted.

(3) Select the variable to be pasted, and press the menu Paste. → The copied variable is pasted, and the highlight returns to normal.
The copied variable is held until a variable is newly copied.

2.17.3 Erasing Common Variables

Operation method (Erasing the variable value for variable number 102 to 104)

- (1) Press the menu [Variabl clear] . → The menu is highlighted.
- (2) Input the No. (range) of the variable to be erased.
102/104 [INPUT]

To erase only one variable, input one variable No.
(102 [INPUT]) → A message confirming the erasing appears.
The background color of the erase range (variable value) changes to light blue.
- (3) Press the [Y] key. → The selected variable is erased.

Operation method (Erasing the variable name for variable No. 509)

- (1) Press the menu [Comment clear] . → The menu is highlighted.
- (2) Select the variable , and press the [INPUT] key
509 [INPUT] → A message confirming the erasing appears.
The background color of the erase range (variable name) changes to light blue.
- (3) Press the [Y] key. → The variable name for 509 only is erased.
The variable value is not erased.

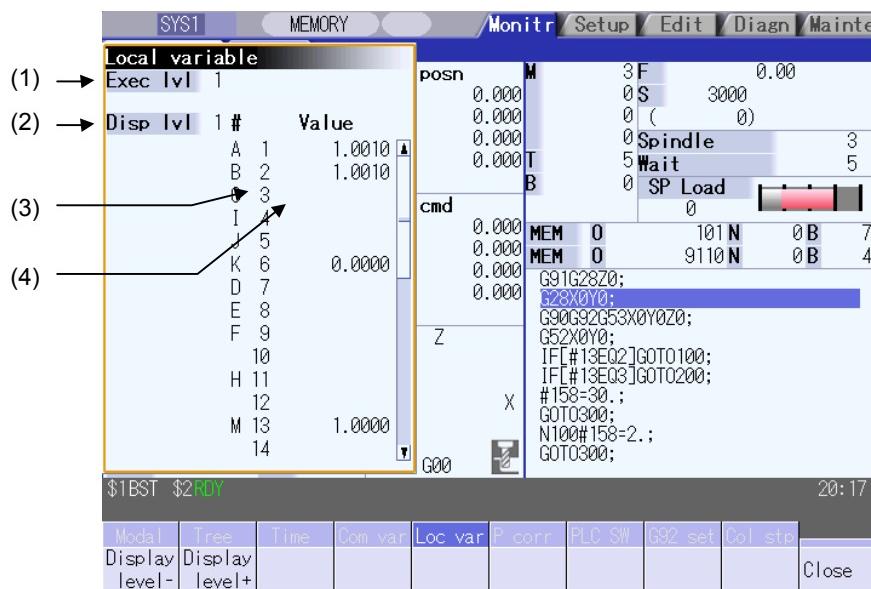
Precautions regarding erasing the variable value and variable name

The variable at the cursor position will become the target of the erasing if the [INPUT] key is pressed without designating a variable No.

2.18 Local Variables

The details of the local variables are displayed.

Local variables 1 to 33 are prepared for each user macro subprogram call level. Up to 33 local variable data items are displayed on one level. A 5-level configuration from level 0 to level 4 is used in page order. If there is a local variable command or an argument designation called by the user macro subprogram in the block, and that block is executed first, the set variable value (variable name) will be displayed.

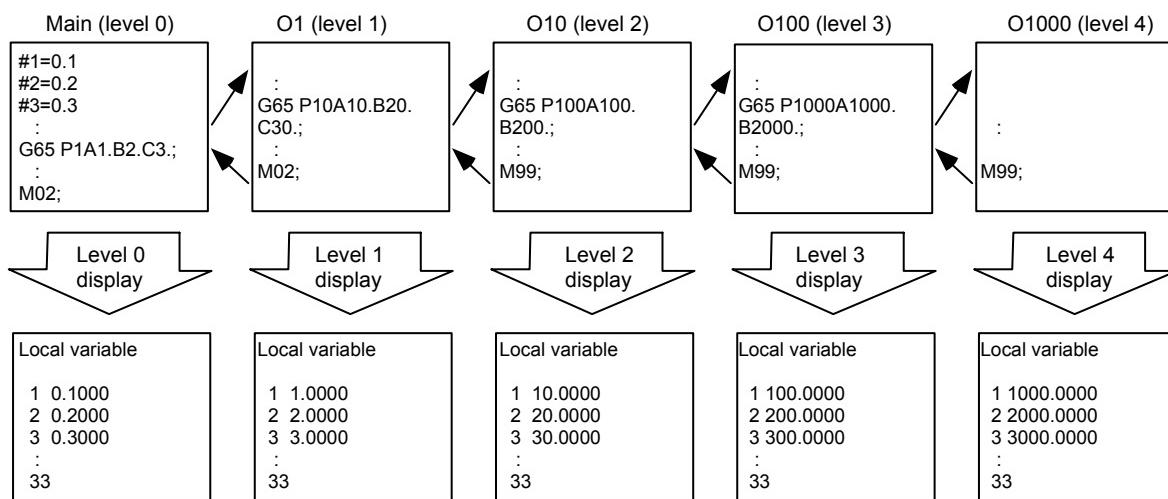


Display items

Display item	Details
(1) Execution level	This displays the nest level of the subprogram control called by the user macro. 0 : Not in user macro call state 1 : User macro call level 1 2 : User macro call level 2 3 : User macro call level 3 4 : User macro call level 4
(2) Display level	This displays the nest level of the local variable displayed in the area.
(3) Variable No.	This displays the local variable No. The alphabetic character before the local variable No. is the argument code. G, L, N, O and P cannot be used as arguments, and thus not displayed. There are 33 local variables (1 to 33) for each user macro subprogram call level.
(4) Variable value	This displays the local variable value. If the variable data is "blank", the display will be blank. An exponential is displayed when a 7 digits are set in the integer section and 5 digits or more as set in the decimal section. (Example) 1234567 → 1.2346E+006, 0.00001 → 1.0000E-005 (Note) When the setting is "blank", the setting will be handled as "0" in the calculations. However, when the conditional expressions EQ or NE are used, the blank will not be handled as "0".

Menus

Menu	Details	Type	Reference
Display level-	This lowers the local variable display level one by one. If this menu is pressed when the display level is 0, the level changes to display level 4.	C	2.18.1 Displaying the Arbitrary Local Variables
Display level+	This increases the local variable display level one by one. If this menu is pressed when the display level is 4, the level changes to display level 0.		
Close	This closes the pop-up window and quits this function.		

Relation of user macro subprogram call execution level and display level**Precautions**

The local variables are not erased when reset or when the power is turned OFF. They are erased at macro call.

2.18.1 Displaying the Arbitrary Local Variables

Operation method (Displaying the next level)

When the current display level is 0

- (1) Press the menu [Display level +]. → The level 1 local variables appear from the head.

When the menu [Display level +] is pressed again, the display level changes in the order of 2 → 3 → 4 → 0 → 1 → 2 → ... and so forth.

Operation method (Displaying the previous level)

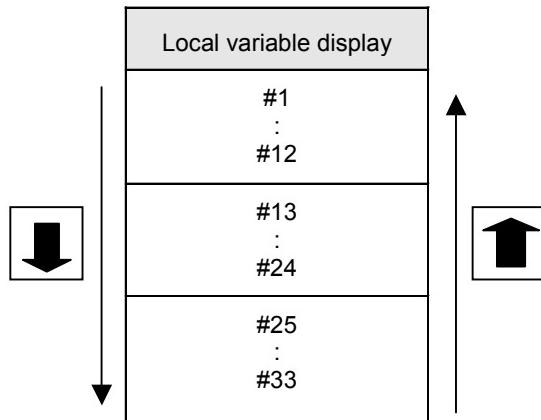
When the current display level is 2

- (1) Press the menu [Display level -]. → The level 1 local variables appear from the head.

When the menu [Display level -] is pressed again, the display level changes in the order of 0 → 4 → 3 → 2 → 1 → 0 ... and so forth.

Operation method (Changing the displayed variable No.)

The displayed local variable No. changes when the page changeover keys (previous page , next page ) are pressed.



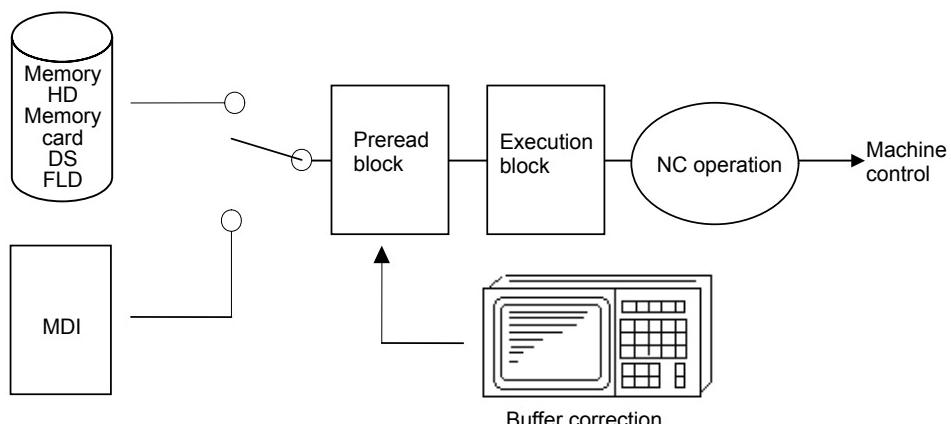
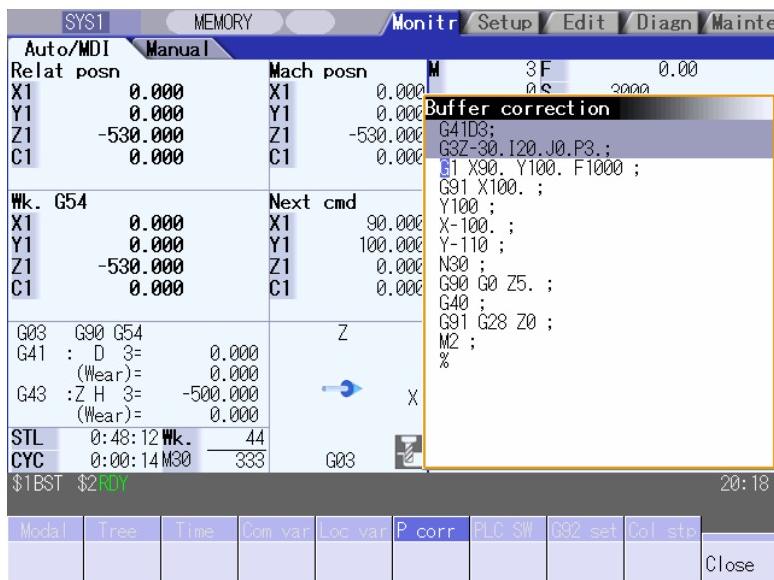
2. Monitor Screens

2.19 Buffer Correction

2.19 Buffer Correction PRG Modification

During automatic operation (Memory, HD, FLD, DS, memory card) or MDI operation, a block stop can be applied, and the next command can be corrected or changed.

When a program error occurs, the block in which the error occurred can be corrected without resetting the NC, and operation can be continued.



- (1) The next command can be corrected in the following two cases.
 - When single block stop is applied, and there is a command block to be corrected in the next command.
 - When there is an error (program error) in the next command and automatic operation is stopped.
- (2) Not only the displayed buffer data but also the contents in the device are corrected with the buffer corrections. (The corrected data is reflected.)
- (3) Several blocks following the next command can be corrected simultaneously.

Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

Operation method

During a single block stop or when a program error stop occurs, the buffer can be corrected with the following operations, and operation can be continued.

The normally executed program appears in the buffer correction area.

N121 G28 X10.Y10.;	← Previous command
N122 T1212;	← Command in execution
N123 S1230 M3;	← Next command and
N124 G00 X68. Z201.;	subsequent commands
N125 G01 X80. Z195. F50;	
N126 Z150.;	
N127 G02 X100. Z185. R20;	

(1) Press the main menu **[Prg correct]**.

→ The buffer correction mode is entered.

N121 G28 X10.Y10.;	← Previous command
N122 T1212;	← Command in execution
N123 S1230 M3;	← Next command and
N124 G00 X68. Z201.;	subsequent commands
N125 G01 X80. Z195. F50;	
N126 Z150.;	
N127 G02 X100. Z185. R20;	

(2) Correct the program with the same method as a normal program editing.

(3) Press the **[INPUT]** key.

→ The buffer correction mode ends, and the corrected data is written into program.
If a program error has occurred, the error display is erased.

(4) Confirm that the corrected data is correct, and then restart.

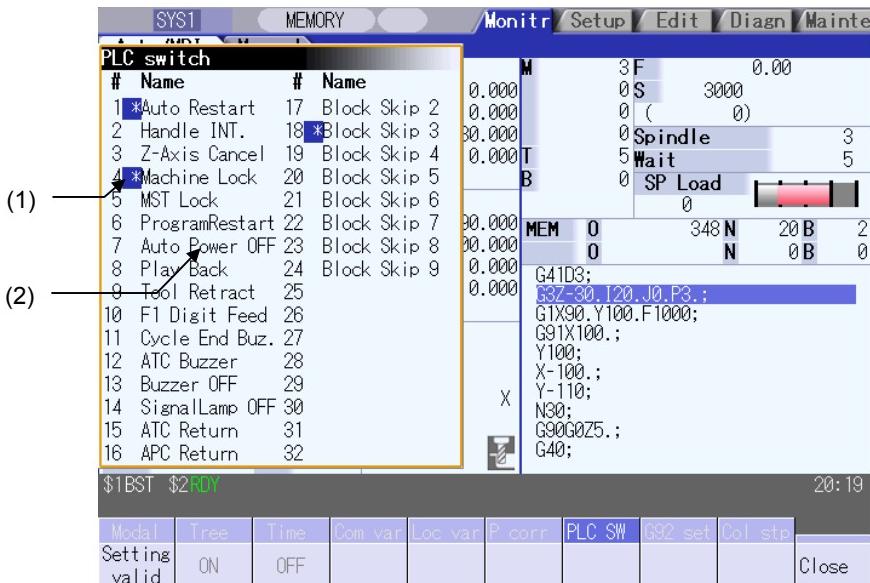
→ The program execution resumes from the currently stopped position.

2. Monitor Screens

2.20 PLC Switch Function

2.20 PLC Switch Function PLC SW

The various control signals for NC operation can be turned ON and OFF.
Refer to the instruction manual issued by the machine tool builder for details.



Display items

Display item	Details
(1) Mark indicating switch ON	This is displayed for switches that are turned ON
(2) Switch name	The display contents differ depending on machine tool builder specification.

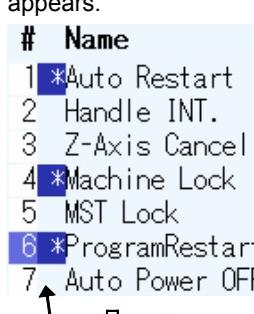
Menus

Menu	Details	Type	Reference
Setting valid	Setting of the PLC switch is started.	A	2.20.1 Turning PLC Switches ON/OFF
ON	This turns ON the switch currently indicated by the cursor.		
OFF	This turns OFF the switch currently indicated by the cursor.		
Close	This closes the pop-up window and quits this function.		

2.20.1 Turning PLC Switches ON/OFF

Operation method (To turn switch "#6 Program restart" ON)

- (1) Press the menu **Setting valid**. → The menu Setting valid will be highlighted. A message confirming the start of PLC switch setting will appear.
- (2) Press "Y" or **INPUT** → The PLC switch setting mode will be entered. The cursor will appear at the PLC switch No. position. The menu keys **ON** and **OFF** will appear normally.
- (3) Press the cursor keys **↑** and **↓** to move the cursor to "#6". → The #6 number is highlighted.

- (4) Press the menu key **ON**. → The "#6 Program restart" switch turns ON, and a ***** mark appears.


To turn OFF, press the menu key OFF.

(Note 1) If the **Setting valid** menu or **◀** key is pressed again during the PLC switch setting mode, the PLC switch setting mode will be canceled.

(Note 2) The PLC switch setting mode is canceled when the PLC switch's pop-up window is closed.

(Note 3) The cursor will not appear in modes other than the PLC switch setting mode.

2. Monitor Screens

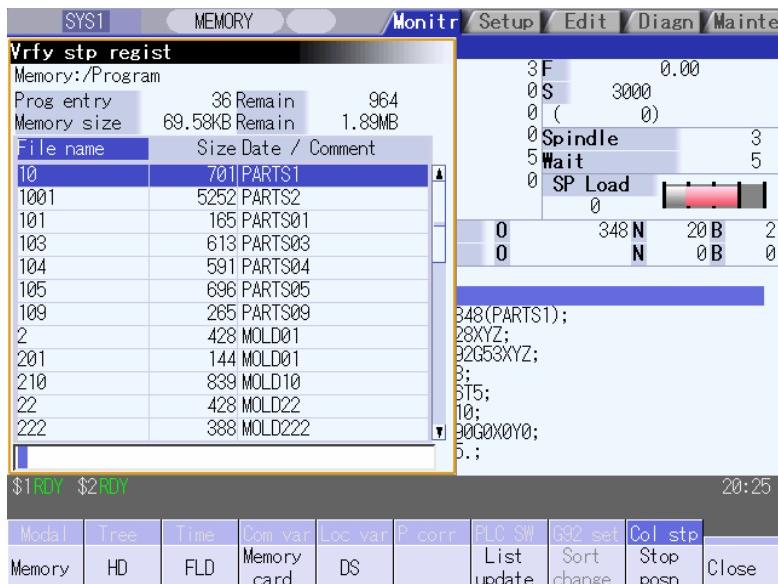
2.21 Verify Stop

2.21 Verify Stop

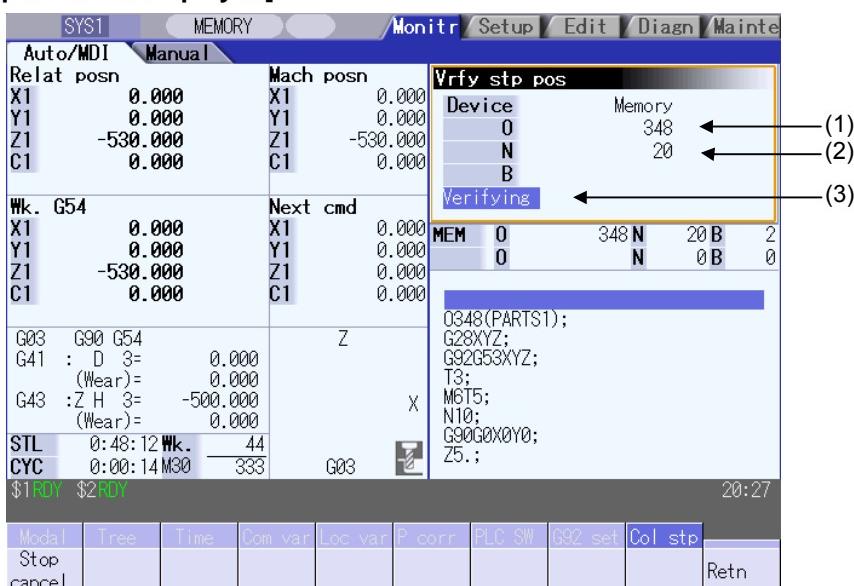
The machining program operation can be block stopped at a registered verify stop position. The registered verify stop position can be canceled.

(Note) Verify stop is an additional specification. The verify stop option is required.

[When verify stop is registered]



[When verify stop position is displayed]



2. Monitor Screens

2.21 Verify Stop

Display items

Display items	Details
(1) Verify stop device name	This is the name of the device for which verify stop is to be executed.
(2) Verify stop position	This is the position of the program where verify stop is to be executed. This display is cleared when program stop is completed, or NC is reset or canceled. If the program No. (program name) exceeds 24 characters, "*" will appear as the 24th character.
(3) Display during verification	This is displayed during verification.

Menus (When verify stop is registered)

Menu	Details	Type	Reference
Memory	This selects the device to be stopped for verification. If a device with a directory is selected, the root is selected first.	C	"Registering the verify stop"
HD		C	
NC serial		C	
Memory card		C	
DS		C	
FLD		C	
List update	This updates the list contents. (The latest contents of the currently selected device and directory are listed.)	C	
Sort change	This changes the method of sorting the list.	C	2.2.3 Changing the Sorting Method
Stop posn	This opens the verify stop position display window as a pop-up window.	C	"Canceling the verify stop"
Comment nondisp	This changes whether to show or hide the list comment field. The file name field is increased when the comment field is hidden.	B	2.2.2 Changing Whether to Show or Hide the Comment Field
Close	This closes the pop-up window and quits this function.	C	

Menus (When verify stop position is displayed)

Menu	Details	Type	Reference
Stop cancel	This cancels the verify stop setting. Note that automatic operation is not reset.	C	"Canceling the verify stop"
Retn	This returns the list to the <When verify stop is registered>.	C	

Operation method (Registering the verify stop)

- (1) Select the part system for executing verify stop with the **\$<->\$** key.
- (2) Press the main menu **Verify stop**.
- (3) Select the device.
(Example) **HD**
- (4) Using the **[↑]**, **[↓]**, **[→]** and **[←]** keys, move the cursor to the directory containing the file to be set.

The currently selected part system is displayed at the upper left of the screen.

The verify stop submenu appears.
The list appears as a pop-up window.

The device name and root directory (HD:/) selected in the device name and directory display fields are displayed.

The following is displayed.

.	DIR
..	DIR
ABC	DIR
SRAM.BIN	1019904 Mar 06 14:54 2003

If the list contents differ from the actual device or directory, press the menu **List update**.

- (5) Press the **INPUT** key.

The cursor moves within the directory.

.	DIR
..	DIR
123.PRG	62 Dec 20 15:24 2002
68.PRG	62 Dec 20 15:24 2002
69.PRG	166 Dec 20 15:24 2002

- (6) Input the program No., sequence No. and block No. using / as a delimiter.
(Example) 1001/1/2 **INPUT**

The verify stop position is displayed, and the program No. ("MDI" for MDI mode), sequence No., block No. and [Verifying] appear.

Device	HD
0	1001
N	1
B	2
Verifying	

- (7) Start the automatic operation.

When the verify stop is completed, a message indicating the end appears.
The stop position displayed on the screen is cleared, and the [Verifying] display is erased.

Device
0
N
B
Verifying

Operation method (Canceling the verify stop)

- (1) Carry out the operations in "Operation method (Registering verify stop)". → The verify stop position appears.
If the verify stop position is not displayed, press the menu [Stop position].
- (2) Press the menu [Stop cancel]. → The stop position displayed on the screen is cleared, and the [Verifying] display is erased.

(Note) Verify stop can also be canceled during operation.

Precautions

- (1) When registering the stop position (O, N, B values), confirm that the block exists in the searched program. Verify stop will not be executed if the corresponding block is not found at the registered stop position.
- (2) Always set one of the O, N or B numbers. If nothing is set, a setting error will occur.
- (3) If the O No. is not set, the O No. used during operation search will be used.
- (4) If the N and B numbers are not set, the block will be searched using the O No.
- (5) If there are several sequences and blocks with the same number in one program, verify stop will be executed after executing the first block that matches in the execution order.
- (6) The settings are canceled when verify stop is executed.
- (7) The settings are canceled when reset is executed.
- (8) If only the program number is set, verify stop will take place at the head of the program only when there is a program number at the first line.
- (9) Verify stop / Verify stop cancel cannot be performed for blocks being executed or blocks already read into the preread buffer.
- (10) Verify stop is not performed in the tapping mode.
- (11) Verify stop is possible in a subprogram, but is not possible in a machine tool builder macro program.
- (12) If verify stop is set for a fixed cycle block, verify stop will be executed after the positioning block is completed.
- (13) Verify stop is possible even when editing is locked.
- (14) Verify stop is executed after executing the block set for the verify stop position. If the verify stop position is set in a program call (M98) block, verify stop will be executed before the subprogram is called.
- (15) If the set block is set to be skipped, verify stop will not be executed.
- (16) The verify stop position can be registered for each part system.
- (17) The stop position cannot be registered during verification.
- (18) Registration of verify stop position is not possible for a program with 33 or more file name characters.
- (19) In the case where the device is HD, memory card, DS, or FLD at the time of verify stop position registration, inputting "0// will be resulted in a setting error.

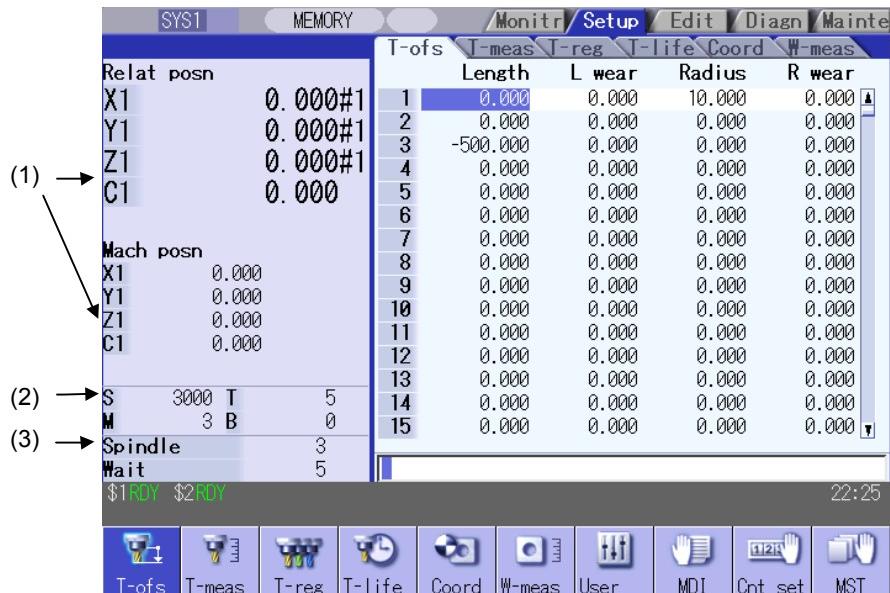
Setup Screen

3. Setup Screen

The setup screen is used to make tool and workpiece related settings, set user parameters, edit the MDI, set the counter, and perform manual numerical value commands.

3.1 Screen Configuration

The setup screen is configured as shown below.



Display items

Display item	Details
(1) Counter display	<p>This displays the relative position and machine position counter. Up to 5 axes can be simultaneously displayed. The following status symbols display if each of the axes are in a set position or status.</p> <ul style="list-style-type: none"> #1 to 4 : Reference position 1 to 4 : Servo OFF status MR : Mirror image >< : Axis removed <p>It is possible to set whether to consider the tool length and diameter compensation using parameter "#1287 ext23/bit4".</p>
(2) M,S,T,B Command	<p>This displays all command values for M (support function command value), S (spindle command rotation speed), T (tool command value) and B (No. 2 support function command value). The spindle command rotation speed displays up to the No. 2 spindle. The presence (absence) of the No. 2 support function command value is designated using parameter "#1170 M2name". Refer to "3.11 Manual Numerical Value Commands" for details.</p>
(3) Spindle/Wait display	<p>The current spindle tool number and standby tool number can be displayed according to the PLC program specifications. (The numbers do not display in the screen if not created with the PLC program.) The contents of this display differ based on the machine tool builder specifications.</p>

3. Setup Screen

3.1 Screen Configuration

Menus

Menu	Details	Reference
 T-ofs	This sets the tool compensation amount. There are three types of tool compensation, and the display differs for each type. The number of tool compensation combinations set/displayed differs depending on the options.	3.2 Tool Compensation amount
 T-meas	This performs the tool measurement. By manually moving the tool to the measurement point, the movement distance from the basic point to the measurement point is measured, and this can be set as the tool compensation amount. This menu displays if the option is enabled.	3.3 Tool Measurement
 T-reg	This registers tools. A tool number is allocated to the tool to allow the NC to recognize the tool attached to the machine. The tool number is registered based on the magazine pot, spindle, and standby location to which the tool is attached.	3.4 Tool Registration
 T-life	This performs the tool life management. The life management data containing information such as the tool usage status is set and displayed. Two management methods are used for tool life management. This menu displays if the option is enabled.	3.5 Tool Life Management
 Coord	This sets the workpiece coordinate system offset amount. This sets and displays the coordinate system offset amount controlled by the NC.	3.6 Workpiece Coordinate System Offset
 W-meas	This performs the workpiece measurement. This menu displays if the option is enabled.	3.7 Workpiece Measurement
 User	This sets the user parameters. This screen is used to switch between, set, and display eleven different parameter types.	3.8 User Parameters
 MDI	This edits the MDI program. Press this menu to show the MDI program contents in a pop-up display.	3.9 MDI Program Editing
 Cnt set	This sets an arbitrary value for the relative position counter.	3.10 Counter Setting
 MST	This performs the manual numerical value commands.	3.11 Manual Numerical Value Commands
 T-list	This searches T code among the designated program (including the subprograms) and lists in order that it was found. This menu is displayed only when the T code list option is valid.	3.12 T Code List
 Pallet	This registers machining programs to the pallet of automatic pallet changer (hereinafter APC). This menu displays if the option is enabled.	3.13 Pallet Program Registration

3. Setup Screen

3.2 Tool Compensation Amount

3.2 Tool Compensation Amount

The tool compensation data can be set and displayed.

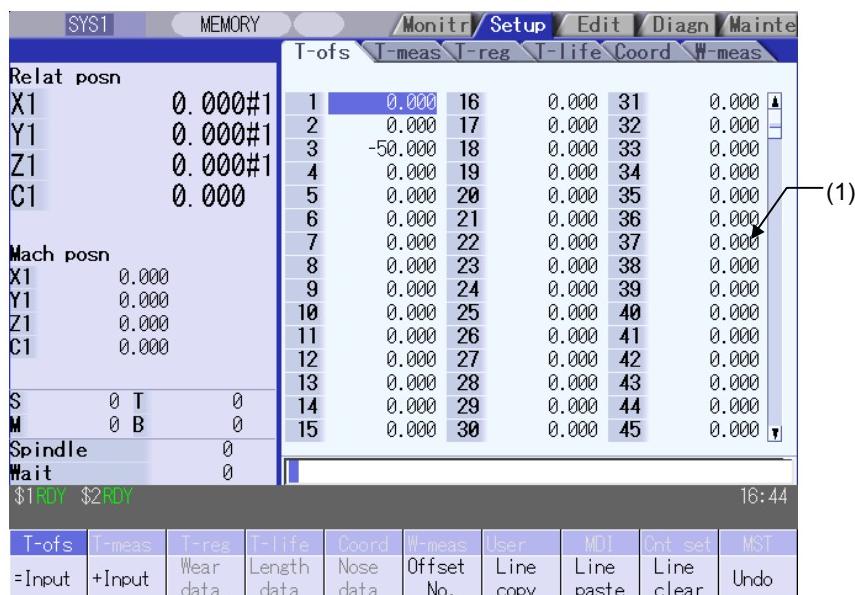
The tool compensation data screen configuration differs according to the tool compensation type.

The number of tool compensation sets to be set or shown differs according to the option.

[Tool compensation type I (M system)] : Parameter "#1037 cmdtyp" = 1

The combined amount of the shape compensation and wear compensation are set as the compensation data, with no distinction between shape compensation memory and wear compensation memory. (The tool compensation data is the shape compensation amount + wear compensation amount.)

The compensation data is used commonly for the tool length compensation, tool position offset, tool radius compensation, and three-dimensional tool radius compensation.

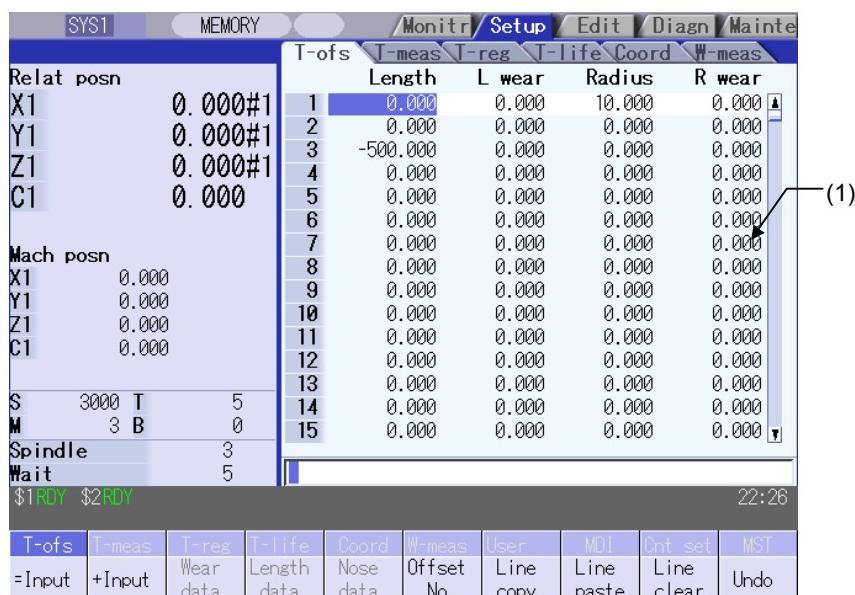


Relat posn									
X1	0.000#1								
Y1	0.000#1								
Z1	0.000#1								
C1	0.000								
Mach posn									
X1	0.000								
Y1	0.000								
Z1	0.000								
C1	0.000								
S	0 T 0								
M	0 B 0								
Spindle	0								
Wait	0								
\$1RDY \$2RDY									
16:44									
T-ofs	T-meas	T-reg	T-life	Coord	W-meas	User	MDI	Ctrl set	MST
=Input	+Input	Wear data	Length data	Nose data	Offset No.	Line copy	Line paste	Line clear	Undo

[Tool compensation type II (M system)] : Parameter "#1037 cmdtyp" = 2

The shape compensation amount and wear compensation amount are set separately. The shape compensation amount is furthermore divided into length and radius dimensions.

Of the compensation data, the length dimension data is used for the tool length compensation and tool position offset, and the radius dimension data is used for the tool radius compensation and three-dimensional tool radius compensation.



Relat posn									
X1	0.000#1								
Y1	0.000#1								
Z1	0.000#1								
C1	0.000								
Mach posn									
X1	0.000								
Y1	0.000								
Z1	0.000								
C1	0.000								
S	3000 T 5								
M	3 B 0								
Spindle	3								
Wait	5								
\$1RDY \$2RDY									
22:26									
T-ofs	T-meas	T-reg	T-life	Coord	W-meas	User	MDI	Ctrl set	MST
=Input	+Input	Wear data	Length data	Nose data	Offset No.	Line copy	Line paste	Line clear	Undo

3. Setup Screen

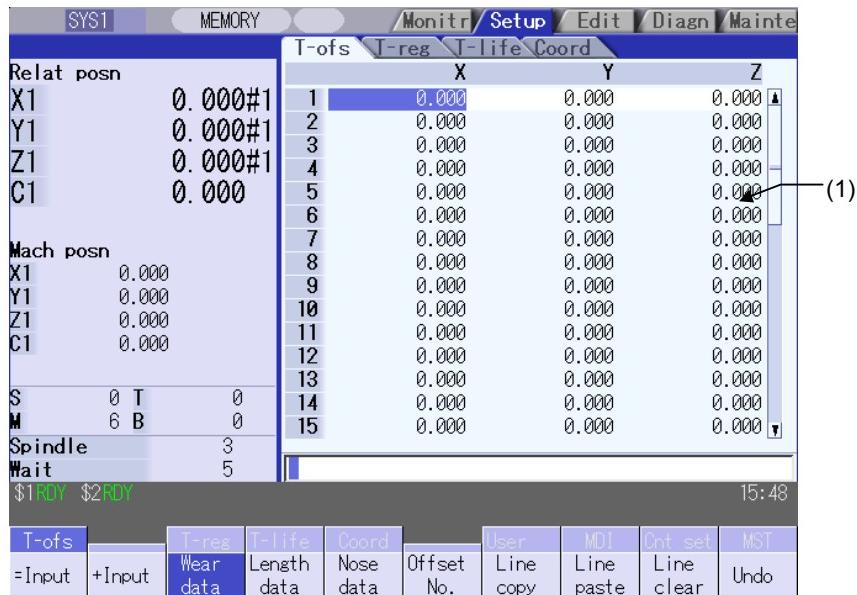
3.2 Tool Compensation Amount

[Tool compensation type III (L system)] : Parameter "#1037 cmdtyp" = 3

The wear data, tool length data and tool nose data are set separately. These are changed with the sub-menu.

(a) Wear data

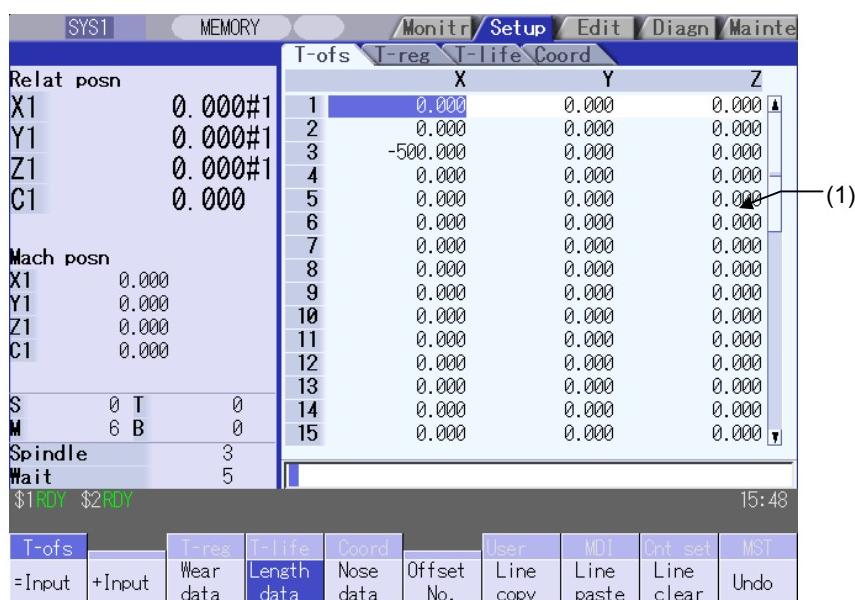
Set the tool nose wear amount for each tool used. When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the tool length data and tool nose data.



(b) Tool Length Data

Set the tool length in respect to the program basic position of each tool used.

When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the wear data and the tool nose data.

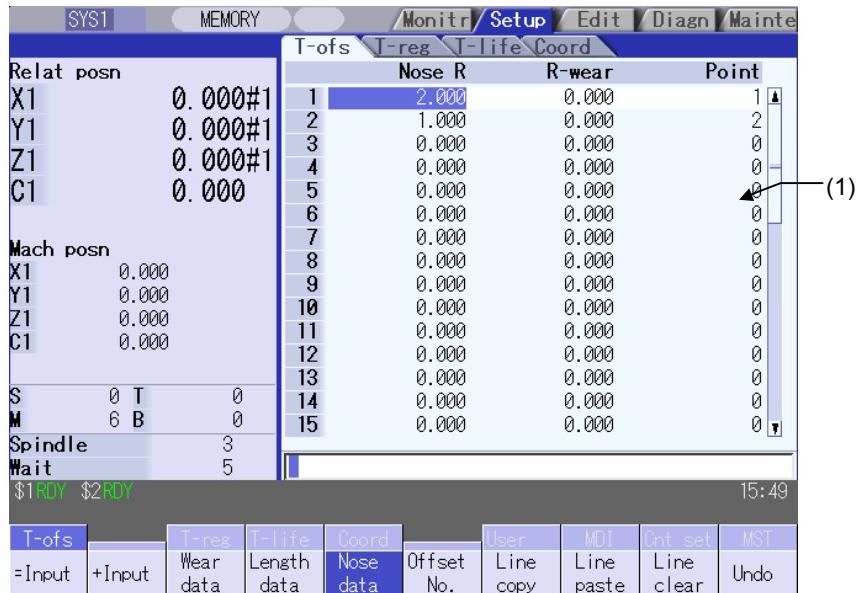


3. Setup Screen

3.2 Tool Compensation Amount

(c) Tool Nose Data

Set the tool nose radius value (tool nose R), wear radius value (R wear) and tool nose point (tool nose point P) of the tool nose mounted on the tool for each tool used. When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the tool length data and tool nose data.



		Nose R	R-wear	Point
	X1	0.000#1	2.000	1
	Y1	0.000#1	1.000	2
	Z1	0.000#1	0.000	0
	C1	0.000	0.000	0
	Mach posn			
	X1	0.000	0.000	0
	Y1	0.000	0.000	0
	Z1	0.000	0.000	0
	C1	0.000	0.000	0
S	0 T	0	0.000	0
M	6 B	0	0.000	0
Spindle		3		
Wait		5		
\$1RDY \$2RDY				
15:49				
T-ofs T-reg T-life Coord User MDI Cnt set MST				
=Input +Input Wear data Length data Nose data Offset No. Line copy Line paste Line clear Undo				



CAUTION

If the tool compensation amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in the next block or after several subsequent blocks.

Display items

Display item	Details					
(1) Display area (continued on next page)	<p>Displays the tool compensation data. The displayed cursor can be moved and data set.</p> <p>Data that cannot be displayed in the display area can be displayed using the keys below.</p> <p>, : Scroll one line at a time.</p> <p>, : Change the display contents one page at a time.</p> <p>Compensation number : This is the compensation data number.</p> <p>Compensation data : The display items differ depending on the tool compensation type.</p> <p>Type I : Compensation data</p> <p>Type II : Length dimension, length wear, radius dimension, radius wear</p> <p>Type III : (Wear, tool length data) No. 1 axis, No. 2 axis, additional axes (Tool nose data) Tool nose R, R wear, tool nose point R</p> <p>The standard settings and display ranges are as follows.</p>					
Type	Settings	Details	Setting/display range			
Type I	Compensation data	This sets the shape and wear combined compensation amounts.	-999.999 to 999.999			
Type II	Length dimension	This sets the tool length compensation amount.	Length/Radius dimension: -999.999 to 999.999 Length/Radius wear: -99.999 to 99.999			
	Length wear	This sets the tool length wear compensation amount.				
	Radius dimension	This sets the tool radius compensation amount.				
	Radius wear	This sets the tool radius wear compensation amount.				
Type III	Wear data	This sets the No. 1 axis, No. 2 axis and additional axis tool nose wear compensation amount. <small>(Note 2) (Note 3) (Note 6) (Note 7)</small>	-9999.999 to 9999.999			
	Tool length data	This sets the No. 1 axis, No. 2 axis and additional axis tool length compensation amount. <small>(Note 2) (Note 3)</small>	-999.999 to 999.999			
	Tool nose R (Note 4)	This sets the tool radius (nose R).	-999.999 to 999.999			
	R wear (Note 4) (Note 6)	This sets the tool radius (nose R) wear amount.	-99.999 to 99.999			
	Tool nose point P (Note 5)	This sets the tool nose point (number).	0 to 9			
<p>(Note 1) The display range is when the minimum command unit is 1µm ("#1003 iunit" = B, "#1041 l_inch" = 0).</p> <p>(Note 2) Set whether to set the additional axis tool nose wear compensation amount for No. 3 or No. 4 axis at parameter "#1520 Tchg34".</p> <p>(Note 3) Displays only for the number of valid axes if only axis 1 or 2 are valid.</p> <p>(Note 4) Set at the radius value if parameter "#1019 dia" is "0", or at the diameter value if this parameter value is "1".</p> <p>(Note 5) An absolute setting is applied even if the tool nose point is entered by pressing the menu and entering a value.</p> <p>(Note 6) Depending on the setting of parameter #8010(Max. value), the setting/display range may be different from the above.</p> <p>(Note 7) Depending on the setting of parameter #8011(Max. additional value), the setting/display range may be different from the above.</p>						

3. Setup Screen

3.2 Tool Compensation Amount

Display item	Details					
Display area (Continued from previous page)	Furthermore, the display and setting ranges are as follows based on the "#1003 iunit" and "#1041 l_inch" setting combination.					
(Type I, Type II, Type III wear and tool length data)						
#1003 iunit	#1041 l_inch	Setting/display range				
		Type II	Length wear Radius wear	Type I	Type II	Length dimension Radius dimension
		Type III	Wear data	Type III	Type III	Length data
B	0	-99.999	to 99.999	-999.999	-999.999	to 999.999
	1	- 9.9999	to 9.9999	-99.9999	-99.9999	to 99.9999
C	0	-99.9999	to 99.9999	-999.9999	-999.9999	to 999.9999
	1	- 9.99999	to 9.99999	-99.99999	-99.99999	to 99.99999
D	0	-99.99999	to 99.99999	-999.99999	-999.99999	to 999.99999
	1	- 9.999999	to 9.999999	-99.999999	-99.999999	to 99.999999
E	0	-99.999999	to 99.999999	-999.999999	-999.999999	to 999.999999
	1	- 9.9999999	to 9.9999999	-99.9999999	-99.9999999	to 99.9999999
(Type III tool nose R, R wear)						
#1003 iunit	#1041 l_inch	Setting/display range				
		Tool nose R		R wear		
B	0	-999.999	to 999.999	-99.999	-99.999	to 99.999
	1	- 99.9999	to 99.9999	- 9.9999	- 9.9999	to 9.9999
C	0	-999.9999	to 999.9999	-99.9999	-99.9999	to 99.9999
	1	- 99.99999	to 99.99999	- 9.99999	- 9.99999	to 9.99999
D	0	-999.99999	to 999.99999	-99.99999	-99.99999	to 99.99999
	1	- 99.999999	to 99.999999	- 9.999999	- 9.999999	to 9.999999
E	0	-999.999999	to 999.999999	-99.999999	-99.999999	to 99.999999
	1	- 99.9999999	to 99.9999999	- 9.9999999	- 9.9999999	to 9.9999999

3. Setup Screen

3.2 Tool Compensation Amount

Menus

Menu	Details	Type	Reference
= Input	This executes an absolute input.	C	3.2.1 Setting the Tool Compensation Data
+ Input	This executes an addition input.		
Wear data	This changes to the wear data display. (Note) This menu displays for Type III.	B	
Length data	This changes to the tool length data display. (Note) This menu displays for Type III.		
Nose data	This changes to the tool nose data display. (Note) This menu displays for Type III.	B	
Offset No.	Set the compensation number and press [INPUT] to put that number to the top and display the tool compensation data. The cursor moves to the contents of that first line.	A	3.2.1 Setting the Tool Compensation Data
Line copy	This copies the contents of the tool compensation data in the selected line (one line).	C	3.2.3 Copying/Pasting the Tool Compensation Data
Line paste	The contents (one line) of the copied tool compensation data are written to the line where the cursor is. If changes are made to the data in that line after [Line copy] is selected from the menu, the data prior to the changes is written when pasting. The data in the copied line can be pasted as many times as is required until new data is copied.	C	
Line clear	This erases the compensation data in the selected line (multiple lines can be erased). Selection method: Select the first and the last compensation number to be erased. [Ex.] 1/E: Set all compensation data to "0". If the [INPUT] key is pressed without selecting a line, the compensation data in the line where the cursor is currently positioned is erased.	A	3.2.2 Erasing the Tool Compensation Data
Undo	This undoes the last changes to the tool compensation data. (This menu is valid for the "Data Input", "Paste Line" and "Undo" operations.)	C	

For Type III, the wear data displays when the power is turned ON.

Following that, the wear data, tool length data, and tool nose data selection is stored.

3.2.1 Setting the Tool Compensation Data

Operation method (Setting "10.000" in the length wear data of compensation No. (102))

(1) Press the menu key **Offset No.**

(2) Designate the Compensation No.
102 **INPUT**

It is possible to use the , , and keys as well to move the cursor to the offset No.102.

The set number appears at the top of the area, and the cursor moves.

	Length	L_wear	Radius	R_wear
102	0.000	0.000	0.000	0.000
103	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000
107	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000

(3) Use the key to move the cursor to the length wear position.

(4) Input the length wear value.
10 **INPUT**

Settings can be made by pressing the **=INPUT** key instead of the **INPUT** key.

The set value displays.

Operation method ("0.012" is calculated and set in the length wear data for compensation number (102).)

(1) Use the same procedure as (1) above to move the cursor to the compensation No. 102 length wear position.

(2) Enter a value.

0.012 **+INPUT**

The input value is added to the original value and displays.
[Ex.] 10.012 displays if the original value is 10.000. (10.000 + 0.012 = 10.012)

3.2.2 Erasing the Tool Compensation Data

Operation method (Erasing one line of tool compensation data at the cursor position)

- (1) Move the cursor to the line to be erased with the **[
]**, **[
]**, **[
]** and **[
]** keys.

The cursor appears at the data item of the selected compensation No.

	Length	L wear	Radius	R wear
102	0.000	0.000	0.000	0.000
103	-280.028	0.000	10.000	0.000
104	-272.083	0.000	0.000	0.000
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000
107	-280.001	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000

- (2) Press the **[Line clear]** and **[INPUT]** menu.

The menu keys are highlighted and a message displays confirming whether it is okay to erase.
The background color of the data to be erased displays in light blue.

- (3) Press the **[Y]** or **[INPUT]** key.

The selected line of data (one line amount) is cleared to zero.

To cancel the erasing, press a key other than **[Y]** or **[INPUT]**.

The data erased to zero displays at the top of the compensation data.

	Length	L wear	Radius	R wear
102	0.000	0.000	0.000	0.000
103	-280.028	0.000	10.000	0.000
104	-272.083	0.000	0.000	0.000
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000
107	-280.001	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000

Operation method (Erasing the compensation data from compensation number 122 to 125.)

- (1) Press the **[Line clear]** menu.

The menu is highlighted.

- (2) Input the compensation number of the data range to be erased.

122/125 **[INPUT]**

A message box displays to confirm whether it is okay to erase the data.

The background color of the data to be erased displays in light blue.

- (3) Press the **[Y]** or **[INPUT]** key.

Press a key other than **[Y]** or **[INPUT]** in order not to erase the data.

The compensation data for the selected compensation number is erased, and the menu highlight returns to normal.
The data cleared to zero displays at the top of the compensation data.

	Length	L wear	Radius	R wear
122	0.000	0.000	0.000	0.000
123	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000
125	0.000	0.000	0.000	0.000
126	-220.068	0.000	12.000	0.000
127	-290.456	0.000	8.000	0.000
128	-280.001	0.000	0.000	0.000

(Note) If the **[INPUT]** key is pressed without selecting an compensation number, the line where the cursor is located is erased.

3.2.3 Copying/Pasting the Tool Compensation Data

Operation method (Copying/pasting one line of tool compensation data)

(1) Move the cursor to the line to be copied with the and keys

(2) Press the menu.

The background color of the copied data changes to light blue.

	Length	L wear	Radius	R wear
100	0.000	0.000	0.000	0.000
101	-255.123	0.000	0.000	0.000
102	-250.008	0.000	10.000	0.000
103	-280.028	0.000	10.000	0.000
104	-272.083	0.000	0.000	0.000
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000

(3) Move the cursor to the line (compensation No.: 109) where the data is to be pasted.

(4) Press the menu.

The copied compensation data is written in the line where the cursor is.

The background color returns to normal.

The copied compensation data is held until another line is copied.

	Length	L wear	Radius	R wear
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000
107	-280.001	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000
109	-250.008	0.000	10.000	0.000
110	0.000	0.000	0.000	0.000
111	0.000	0.000	0.000	0.000

(Note 1) If the compensation data for the copied line is changed after the menu is pressed, the data prior to the change is written when pasted.

(Note 2) When copied at Type III, it is not possible to paste the data to a different display (wear data, tool length data, tool nose data).

3.3 Tool Measurement

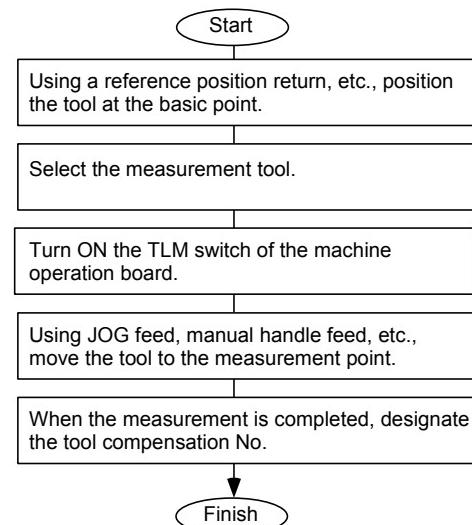
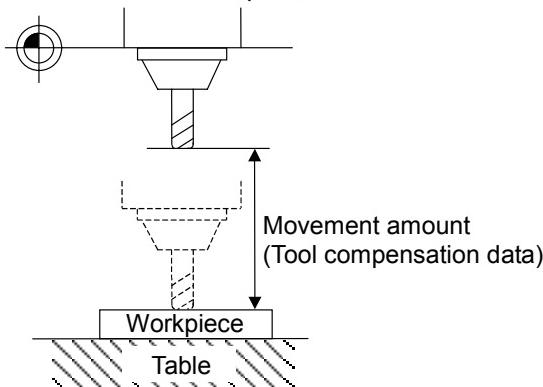
By manually moving the tool to the measurement point, the movement distance from the basic point to the measurement point is measured, and this can be set as the tool compensation amount.

There are two types of tool measurement: Tool length measurement I, Tool length measurement II

■ Tool length measurement I

When the tool is at the machine coordinate zero point, the distance from the tool tip to the measurement point (workpiece upper end) is measured, and can be set as tool compensation data.

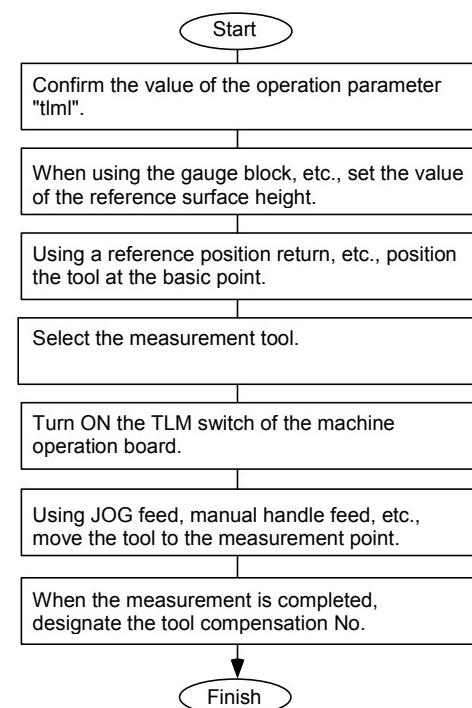
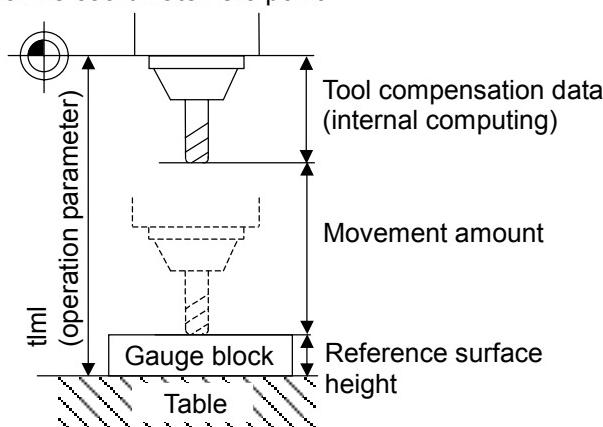
Machine coordinate zero point



■ Tool length measurement II

When the tool is at the machine coordinate zero point, the distance from the machine coordinate zero point to the tool tip is measured, and can be set as tool compensation data.

Machine coordinate zero point

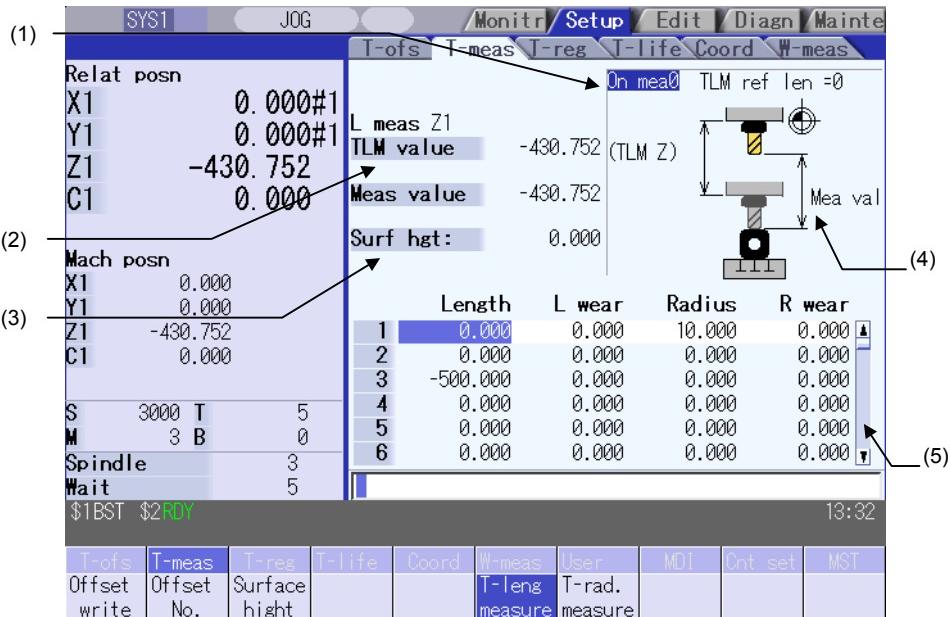


(Note) Changing of the tool measurement type is determined based on the measurement axis (tool length measurement axis, tool radius measurement axis) TLM reference length (parameter "#2016 tlml+") at each measurement mode. When parameter "#2016 tlml+" is "0", the tool measurement type is tool length measurement I.

3. Setup Screen

3.3 Tool Measurement

■ Screen image

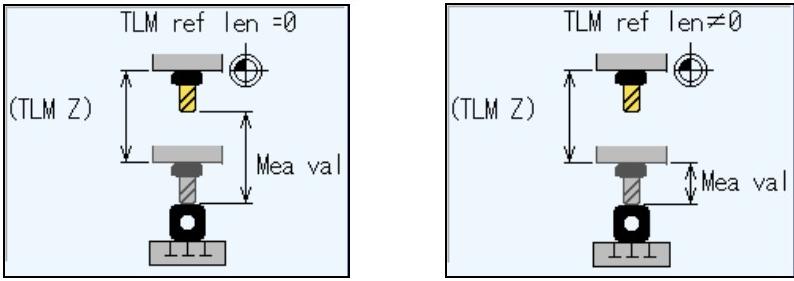


Display items

Display item	Details
(1) Manual measurement status display	This displays the manual measurement status. Refer to the "Manual measurement status display" section for further details.
(2) Counter display	TLM value : This displays the value during measurement. This will be the same as the machine position until the sensor is contacted. This will be the skip coordinate position after the sensor is contacted. Measurement value : For tool length measurement type I : TLM value – Reference surface height For tool length measurement type II : TLM value – Reference surface height + TLM reference length For tool radius measurement, measurement result is displayed in absolute value. (Note) The TLM value counter differs according to the parameter "#1328 TLM type" value. 0 : The position when the measurement switch was turned ON is displayed as 0. 1 : The display is based on the machine zero point.
L meas : Z (Axis name) R meas : X (Axis name)	The axis selected in the parameters "#8711 TLM L meas axis" and "#8712 TLM D meas axis" is the target axis for the measurement.
(3) Reference surface height	This displays a value for the reference surface height. The setting range is from -99999.999 to 99999.999(mm)

3. Setup Screen

3.3 Tool Measurement

Display item	Details	
(4) Guide drawing	<p>This displays the measurement image. The contents of the guide drawing will differ depending on the tool measurement type.</p> <p>Tool length measurement I guide drawing Tool length measurement II guide drawing</p> 	
(5) Tool compensation data	<p>This displays the tool compensation data. Depending on the tool compensation type (I/II), the display details of the displayed tool compensation data will differ.</p>	

Menus

Menu	Details	Type	Reference
Offset write	<p>This writes the value displayed in "Mea value" as the tool compensation amount. The wear amount is cleared to "0" for the tool compensation type II. The tool compensation amount cannot be written in when the menu Offset No. or Surface hight is highlighted.</p>	C	
Offset No.	<p>When the compensation No. is set and the INPUT key is pressed, the tool compensation data with that number at its head appears. The cursor moves to the length dimension data of the top line of that data.</p>	A	3.2.1 Setting the Tool Compensation Data
Surface hight	<p>This sets the reference surface height data. (The cursor moves to the reference surface height.) When the data is set in the input area and the INPUT key is pressed, the reference surface height is set.</p>	A	
T-leng measure	<p>This changes the mode to the tool length measurement mode. This mode is enabled when turning ON the power. (The cursor moves to the length dimension position for tool compensation type II.)</p>	B	Carrying Out Tool Length Measurement
T-rad. measure	<p>This changes the mode to the tool radius measurement mode. (The tool measurement type is valid only for tool length measurement II.) (The cursor moves to the radius dimension position for tool compensation type II.)</p>	B	Carrying Out Tool Radius Measurement

3.3.1 Carrying out tool length measurement

Operation method

- (1) Turn ON the measurement switch. → The message "On mea 0" appears.
Refer to the PLC Interface Manual for details on measurement switch signals.
 - (2) Press the [T-leng measure] menu. → The menu is highlighted, and the tool length measurement starts. The measurement values are displayed in "Meas value" during the measurement.
The menu [T-leng measure] is highlighted as a default after the power is turned ON.
 - (3) Contact the measurement tool against the sensor, using manual feed and manual handle feed. Stop the feed when the tool contacts the sensor. → When the measurement tool contacts the sensor, the skip position displayed in the measurement values counter.
 - (4) The cursor moves to the compensation No. that sets the measurement results.
Offset No. 12 INPUT
The cursor display position differs depending on the measurement mode.
Tool length measurement mode:
Length dimension
Tool radius measurement mode:
Radius dimension
→ The cursor appears.
 - (5) Press the [Offset write] menu. → The measurement values are written as a tool compensation amount.
The wear amount is cleared to "0" for the tool compensation type II.
- (Note 1)** The measurement values are not written if the cursor is in a position other than "Length" or "Radius".
- (Note 2)** The axis returns and stops after contacting the sensor, but be careful not to move the axis after that. If the axis moves after contacting the sensor, the distance that was actually moved will be added to the measurement values counter, and the skip position will not be held.
- (6) Turn OFF the measurement switch to finish measuring. → The message "On mea 0" disappears.

3. Setup Screen

3.4 Tool Registration

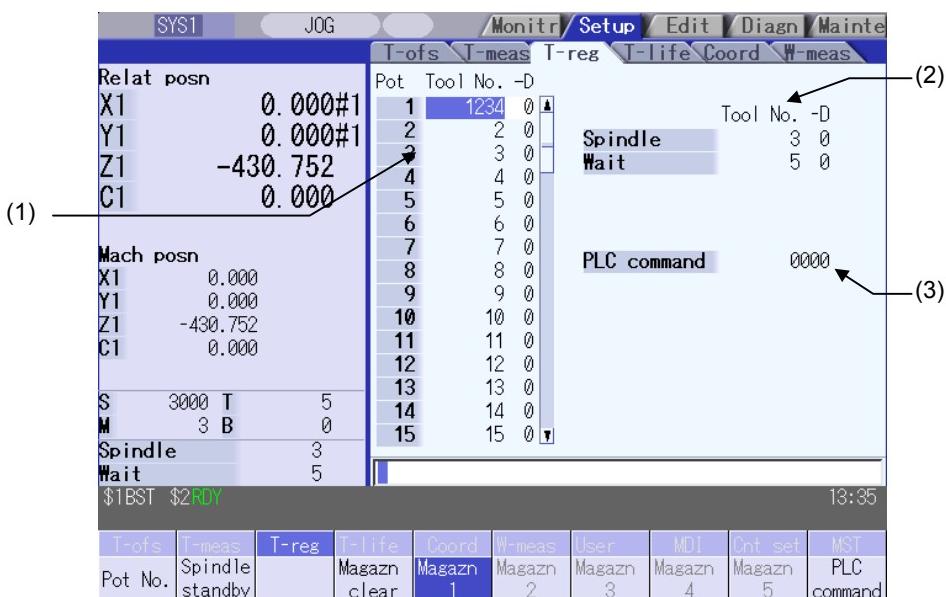
3.4 Tool Registration

A tool No. is assigned to each tool to make the tools installed on the machine recognizable to the NC. The tool No. is registered corresponding to the magazine pot and spindle where that tool is installed, and the standby location.

When the tool No. and magazine pot are changed by a tool selection command or tool replacement command, the new tool No. is displayed.

When not making an arbitrary setting for the number of registered tools, there are maximum 3 magazines, and up to 120 tools can be registered for each magazines. When making an arbitrary setting, there are a maximum of 5 magazines, and up to 360 tools can be registered for all magazines.

This function differs depending on the specifications of the machine tool builder. Refer to the instruction manual issued by the machine tool builder for details.



Display items

Display item	Details
(1) Magazine	This displays the currently selected magazine No.
(2) Tool No.-D	A maximum of 8 digits of data can be input for a tool No. (Refer to the instruction manual issued by the machine tool builder for D functions and purposes.) When the "Tool No." column is blank, confirm the tool first, since the tool could not be mounted, or the tool could not match the spindle. Setting "0" erases the registered tool.
(3) Spindle/Wait (used by PLC program)	This displays the magazine 1 spindle or standby tool No. (The name of this area differs depending on the output from the PLC program.) (Note) Displayed contents depend on the ATC parameter setting.
(4) PLC command	This command is used to input data and perform sequence processing using the PLC program.

Menus

Menu	Details	Type	Reference
Pot No.	Set the magazine pot number and press the INPUT key to position that pot number at the top and display the tool number. The cursor moves to the tool number for that pot number.	A	3.4.1 Registering a Tool in the Magazine Pot
Spindle standby	This sets or erases the tool No. of spindle and standby tools. The cursor will move to the top tool No. of the spindle and standby tools and the setting mode will be entered.	A	3.4.3 Setting/Erasing the Tool No. of Spindle/Standby Tools
Magazn clear	This erases all the currently selected magazine tool data (tool number and D). (Note 1) Unselected magazine tool data is not erased. (Note 2) The spindle and standby data cannot be erased.	A	3.4.3 Setting/Erasing the Tool No. of Spindle/Standby Tools
Magazn 1 : Magazn 5	This designates the magazine No. to be displayed on the screen. The displayed menu differs according to the machine specifications. [Ex.] When there are two magazines, only the menu Magazine 1 and Magazine 2 keys display.	B	3.4.1 Registering a Tool in the Magazine Pot
PLC command	The cursor moves to the PLC command setting area and the mode changes to the setting mode.	B	3.4.2 Setting the PLC Command

3.4.1 Registering a Tool in the Magazine Pot

Operation method (Selecting a magazine No.)

(1) Press the menu [Magazn 2].

The tool data of the set magazine No. appears.

Pot	Tool No.	-D
1	12345678	32
2	2 0	
3	3 0	

(Note) The No. of magazines differs according to the machine specification.

Operation method (Registering the tool in the magazine pot)

(1) Designate the pot No.
Pot No. 21 INPUT

The tool data appears with the designated pot No. at the head.

The cursor moves to the tool No. setting column.

Pot	Tool No.	-D
21	5678	2
22	2 0	
23	3 0	

(2) Input the tool number.
50 INPUT

The input tool number displays and the cursor moves to the next tool number.

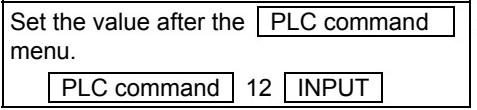
Pot	Tool No.	-D
21	50	2
22	2 0	
23	3 0	

(Note) To set "D", use the key to move the cursor.

Refer to the manual issued by the machine tool builder for details on the "D" functions and purposes.

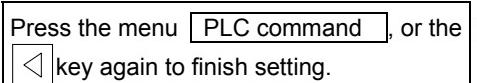
3.4.2 Setting the PLC Command

Operation method (Setting the PLC command)

- (1) Set the value after the **PLC command** menu.
- 
- The set value displays in the PLC command setting field, and the PLC command setting mode is enabled.
The function of the command depends on the machine tool builder's specifications.

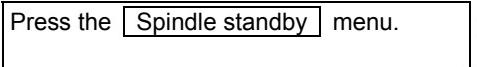
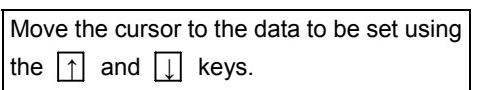
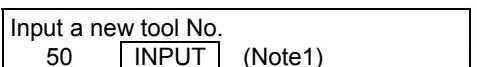
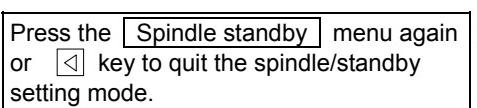


(Note) Select the **PLC Command** menu again before pressing the **INPUT** key, then the menu highlight returns to normal, and the PLC command setting mode becomes disable.

- (2) Press the menu **PLC command**, or the **◀** key again to finish setting.
- 
- The PLC command setting mode is released, and the menu highlight returns to normal.

3.4.3 Setting/Erasing the Tool No. of Spindle/Standy Tools

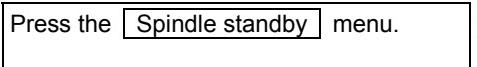
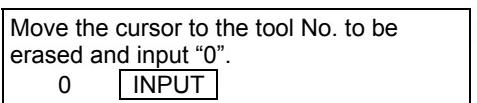
Operation method (Setting the tool No. of spindle/standby tools)

- (1) Press the **Spindle standby** menu.
- 
- The cursor appears at the top tool No. of spindle/standby. In addition, the first "D" column is highlighted.
- (2) Move the cursor to the data to be set using the **↑** and **↓** keys.
- 
- (3) Input a new tool No.
50 **INPUT** (Note1)
- 
- The tool No. changes. The cursor moves to the next tool No.
- (4) Press the **Spindle standby** menu again or **◀** key to quit the spindle/standby setting mode.
- 
- The spindle/standby setting mode is cancelled.

(Note 1) When the **Spindle standby** menu again or **◀** key is pressed before pressing the **INPUT** key, the spindle/standby setting mode will be cancelled and the set data will be ignored.

(Note 2) Move the cursor with **→** key to set the "D" data.

Operation method (Erasing the tool No. of spindle/standby tools)

- (1) Press the **Spindle standby** menu.
- 
- The cursor appears at the top tool No. of spindle/standby. In addition, the first "D" column is highlighted.
- (2) Move the cursor to the tool No. to be erased and input "0".
0 **INPUT**
- 
- The tool No. of spindle/standby changes to "0".

(Note 1) Move the cursor with **→** key and set "0" to erase the "D" data as the same manner as the tool No.

3.5 Tool Life Management

The life management data of the tool usage conditions, etc., is set and displayed.
The tool life management specifications differ for the M and L system.

<M system>

■ Tool life management I

The usage time or No. of uses of the tool commanded in the program is incremented, and the usage state of that tool is monitored.

■ Tool life management II

This method is the same as tool life management I, but with a spare tool selection function added.
A spare tool is selected from the group of tool commands commanded in the program. Tool compensation (tool length compensation and tool radius compensation) is carried out for the selected tool.

The tool life management related parameters (basic common parameters) include the following.

#	Item	Setting	Details
1103	T_Life T-life manage valid	0	This ignores the tool life management data.
		1	This controls the tool life management.
1104	T_Com2 Tool com 2 (When tool life management is valid.)	0	This treats the program tool command as a group No. Search for the group No. that matches with the tool No. in the tool registration data, and select the spare tool from there.
		1	This treats the program tool command as a tool No.
1105	T_sel2 Tool com 2 (When tool life management is valid.)	0	This selects the tool from the tools in use in the same group, following the registration No. order. If there are no "Tools in use", the tools are selected in order of "Tools not in use", "Normal life tools" and "Abnormal tools", following the registration No. order.
		1	This selects the tool with the maximum remaining life from the tools in use and not in use in the same group. When several tools have the same remaining life, the tools are selected in order of registration No. If there are no "Tools in use" or "Tools not in use", the tools are selected in order of "Tools not in use", "Normal life tools" and "Abnormal tools", following the registration No. order.

<L system>**■ Tool life management I.....Tool life data display**

The tool usage time and usage count indicated in the program is accumulated, and the usage status for that tool is monitored. Tool life management can be performed for a maximum of 80 tools (tool Nos. 1 to 80).

(a) Time based control

The cutting time (G01, G02, G33 etc.) after performing the tool selection command (T) is calculated in the tool usage time corresponding to the designated tool.

A warning is issued if the usage time at the time the tool selection command is performed reaches the life time.

(b) Usage count based control

The tool usage count corresponding to the designated tool No. increases each time the tool selection command (T) is performed.

A warning is issued if the usage count at the time the tool selection command is performed exceeds the life time.

■ Tool life management II.....Tool life data display / registration group list display

The life (usage time, usage count) of each tool is controlled, and if the life is reached, the same spare tools are selected and used one by one from the group to which that tool belongs.

- Group count : Multi-part system spec. : max. 40 groups for each part system
Single part system spec.: max. 80 groups

- No. of tools in group : Max. 16

The tool life management related parameters (basic shared parameters) are shown below.

#	Name	Setting	Details
1096	T_Ltyp (For L system only) Tool life management type	1	Tool life management I
		2	Tool life management II
1103	T_Life Enable tool life management	0	The tool life management is not performed.
		1	The tool life management is performed.
1107	Tllfsc (For L system only) Tool life management Display screen division	Set the no. of groups displayed at the tool life management II (L series) screen.	
		0	Displayed no. of groups: 1, Max. No. of registered tools: 16
		1	Displayed no. of groups: 2, Max. No. of registered tools: 8
		2	Displayed no. of groups: 4, Max. No of registered tools: 4

The tool life management screen is made up of the group list display screen and the life management data screen.

(There is no group list display screen in L system tool life management 1. Only the life management data screen exists.)

Refer to the following sections for details of the display contents, menus, and an explanation of the operations for each screen.

"3.5.1 Displaying the Group List"

"3.5.2 Displaying the Life Management Data in Group Units (M system)"

"3.5.3 Displaying the Life Management Data (L system: Tool life management I)"

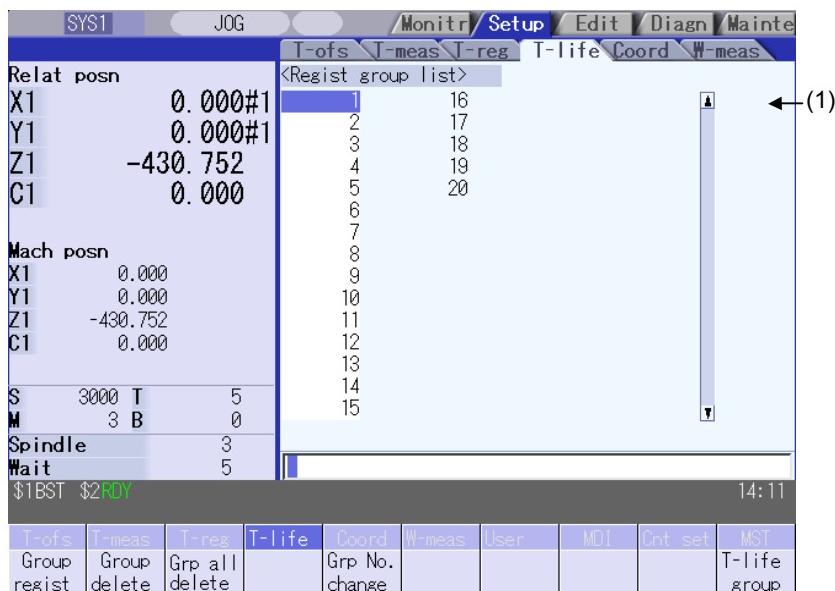
"3.5.4 Displaying the Tool Life Management Data in Group Units (L system: Tool life management II)"

3.5.1 Displaying the Group List

Tool life management data groups can be registered and erased.

<M system>

When changing from a group unit display to the group list display, the cursor displays at the group No. at the group unit display.



Display items (M system)

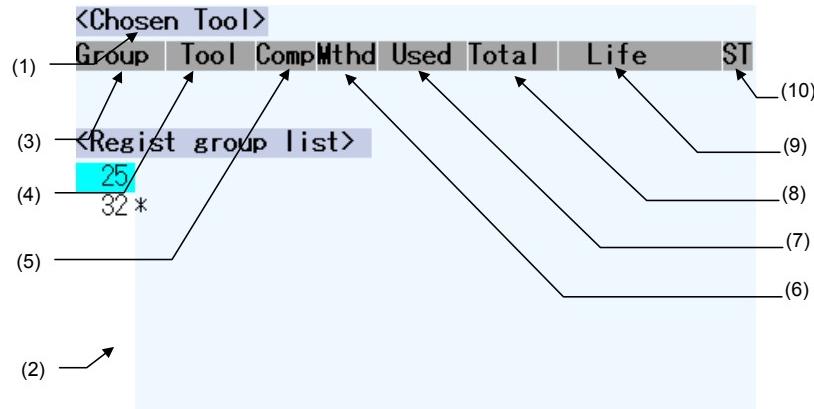
Display item	Details
(1) Regist group list	<p>The group Nos. registered as the tool life management data are listed in ascending order.</p> <p>Group Nos. can be set from 1 to 99999999, and maximum 1000 groups ^(Note) can be set.</p> <p>Maximum 60 groups can be displayed at a time. Use the / keys to change the display if the No. of registered groups exceeds 60.</p> <p>An asterisk will be added to the No. of the group in which all tools have reached their lives.</p> <p>(Note) The maximum number of the registered groups depends on the option.</p>

3. Setup Screen

3.5 Tool Life Management

<L system>

This screen is enabled only for tool life management type II (parameter "#1096 T_Ltyp" = 2).
The tool life management data currently being used and the group list display.



Display items (L system)

Display item	Details
(1) Chosen Tool	The life management information of the tool currently being used appears here.
(2) Regist group list	The group Nos. registered as the tool life management data are displayed in a list. Group Nos. can be set from 1 to 9999, and maximum 80 groups can be set. An asterisk will be added to the No. of the group in which all tools have reached their lives. (Note) The maximum number of the registered groups depends on the option.

[CHOSEN TOOL]

Display item	Details	Display range
(3) Group	Displays the life management group No. currently being used.	1 to 9999
(4) Tool No.	Displays the tool No. currently being used.	1 to 999999
(5) Comp No.	Displays the compensation No. currently being used.	1 to 80
(6) Mthd	Displays whether the group currently being used is controlled by the usage time or usage count.	0: Time 1: Count
(7) Used	Displays the usage data for the tool currently being used.	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)
(8) Total	Displays the total usage data for the tool currently being used. In the case of tools using multiple compensation Nos., the total usage data for all compensation Nos. displays. In the case of only one compensation No., the same value as "Used" displays.	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)
(9) Life	Displays the life value for the tool currently being used.	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)
(10) ST	Displays the status of the tool currently being used.	0: Unused tool 1: Used tool 2: Normal life tool 3: Skipped tool

3. Setup Screen

3.5 Tool Life Management

Menus (M system/L system)

Menu	Details	Type	Reference
Group regist	Creates a new group and adds the group No. to the list.	A	"Registering a group"
Group delete	This erases all of the tool life management data included in the designated group No. If the group No. is not designated, the tool life management data for the group No. indicated by the cursor will be erased.	A	"Erasing a group"
Grp all delete	This erases all groups and their tool life management data registered in the part system which is currently selected.	A	"Erasing all groups"
Group change	Changes the group No.. Specify a new group No. and press the INPUT key to change the group No. and then change the contents of the list. An error occurs if an existing group No. is specified.	A	"Changes the group No."
T-life group	The tool life data for the group No. indicated by the cursor will be displayed. This changes to the mode enabling tool life management data to be set and displayed with group unit Nos.	C	"Changing to the group unit display"

Operation method (Registering a group) (M system/L system)

- (1) Press the menu [Group regist].
- (2) Designate the group No. to be registered. → The life management data for the selected group No. displays empty.
 25 INPUT
 The group No., method, and life value is set at the L system.
 (Example) 25/1/3000 INPUT

- (Note 1)** An error occurs if the group No. duplicates a pre-existing group No.
(Note 2) The group is not registered if the following operations are performed after newly registering a group No..
- The application is exited without registering even 1 item of tool life data.
 - The screen is changed to that of other than the group unit display.
 - The part system is changed.

Operation method (Erasing a group) (M system/L system)

- (1) Press the menu [Group delete].
- (2) Designate the group to be erased. → The selected group No. is erased.
 72 INPUT

If nothing is input in the input area, the group at the cursor location is erased.

Operation method (Erasing all groups) (M system/L system)

- (1) Press the menu [Grp all delete]. → The confirmation message appears.
- (2) Designate the group to be erased.
72 [INPUT] → All the registered groups and their tool life management data is erased.

(Note 1) If no group has been registered, the operation message "Can't delete all groups" will appear.

Operation method (Changing the group No.) (M system/L system)

(Ex.) Changing the group No. from 5 to 20

- (1) Use the **[↑]**, **[↓]**, **[▲]** and **[▼]** keys to move the cursor to group No. 5.
- (2) Press the menu [Group change] key. → The menu is highlighted.
- (3) Set the new group No..
20 [INPUT] → The group No. changes to "20".

Operation method (Changing to the group unit display) (M system/L system)

(Ex.) Displaying the group No. 5 tool life data.

- (1) Use the **[↑]**, **[↓]**, **[▲]** and **[▼]** keys to move the cursor to group No. 5.
- (2) Press the menu [T-life group] or [INPUT] keys. → The screen changes to the group unit display and the group No. "5" tool life management data displays.

<M system>

Group No. 5					
#	Tool No.	ST Mthd	L compen	R compen	
1	301	00 000	0	0	
2	302	00 000	0	0	
3	303	00 000	0	0	
4	304	00 000	0	0	
5	305	00 000	0	0	

<L system>

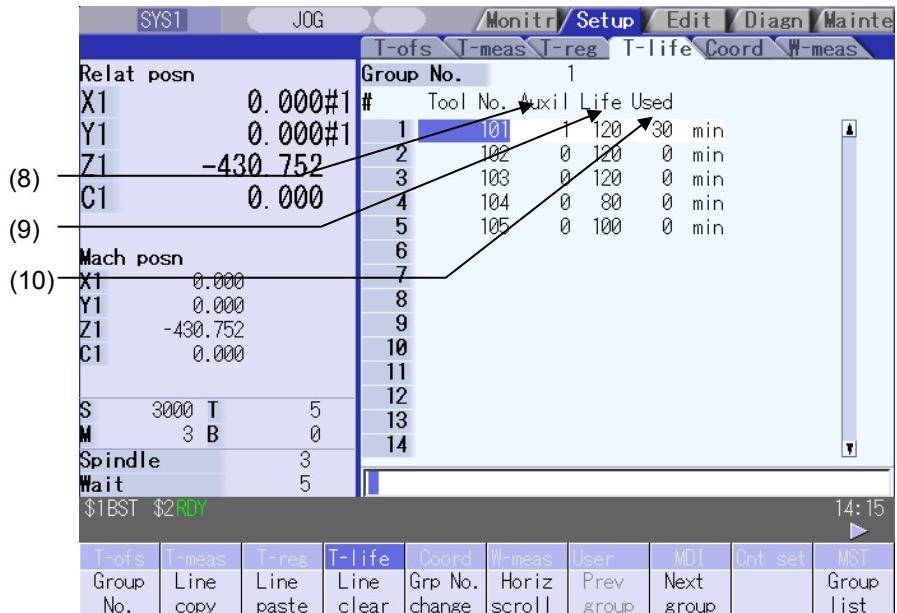
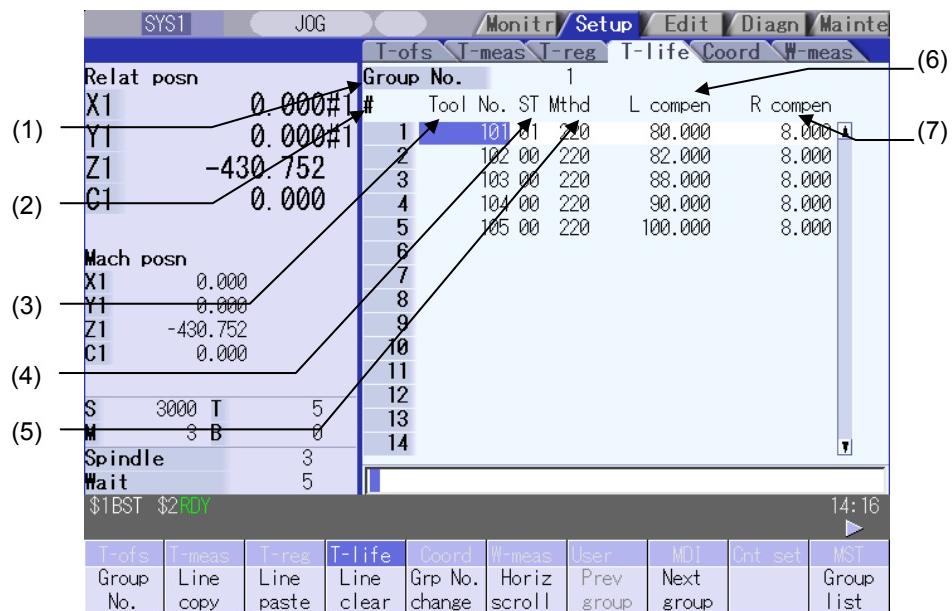
Group: 5 Form: 1 Life: 3000 (set)				
#	Tool	Comp	Used	(set) ST
1	1	2	0	0
2	2	2	2	1
3	5	5	5	1
4	6	6	6	1
5	7	7	7	1
6	8	8	8	1
7	9	9	9	1
8	10	10	10	1

3. Setup Screen

3.5 Tool Life Management

3.5.2 Displaying the Life Management Data in Group Units (M system)

The tool life management data of an arbitrary group is set and displayed. If the registered tools cannot be displayed on one screen, scroll the screen using the or key.



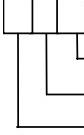
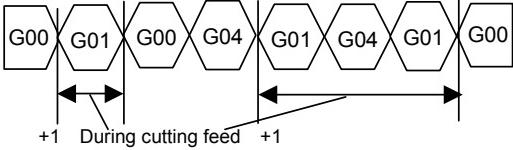
Display items (M system)

Display item	Details	Display range
(1) Group No.	This is the group No. of the tool for which tool life management is performed. Tools with the same group No. are regarded as spare tools.	1 to 99999999
(2) #	This is the data setting No.. This is not the magazine pot No.	
(3) Tool No.	This is the No. corresponding to the each individual tool. Maximum 1000 tools can be registered. This is a fixed tool No. actually output for the tool command and so on.	1 to 99999999
(4) ST	 Tool status Machine manufacturer release Tool status 0 : Unused tool Normally set to "0" when the tool is replaced with a new tool. 1 : Used tool This becomes "1" when the cutting actually starts. 2 : Normal life tool This becomes "2" when the usage data (usage time and No. of uses) exceeds the life data. 3 : Tool abnormality 1 tool 4 : Tool abnormality 2 tool (Note) Item 3 and 4 differ depending on the machine tool builder specifications.	

3. Setup Screen

3.5 Tool Life Management

(M system)

Display item	Details	Display range
(5) Mthd	 <ul style="list-style-type: none"> (a) Tool life management method (b) Tool radius compensation data format (c) Tool length compensation data format <p>(a) Tool life management method</p> <p>0 : Usage time This manages by the cutting execution time.</p> <p>1 : No. of mounting times This manages by the No. of times the tool became the spindle tool in tool replacement, etc. However, in the case where the cutting feed command (G01, G02, G03 etc.) is not executed even once after becoming the spindle tool, the No. of times is not counted.</p> <p>2 : Usage count This is counted when the rapid traverse command (G00 etc.) is changed to the cutting feed command (G01, G02, G03 etc.). However, this is invalid in the case of a rapid traverse or cutting feed command with no movement.</p>  <p>(b) Tool radius compensation data format</p> <p>(c) Tool length compensation data format</p> <p>0 : Compensation No. The tool life management data compensation data is handled as a compensation No., this No. replaces the compensation No. designated in the process program, and compensation is performed.</p> <p>1 : Added compensation amount The tool life management data compensation data is handled as the added compensation amount, an addition is made to the compensation amount shown with the compensation No. designated in the process program, and compensation is performed.</p> <p>2 : Direct compensation amount The tool life management data compensation data is handled as the direct compensation amount, this No. replaces the compensation amount shown for the compensation No. designated in the process program, and compensation is performed.</p>	
(6) L compen	This depends on the data format designated in "Mthd".	Compensation No. : 1 to 400 Added compensation amount Direct Compensation amount (Note 1)
(7) R compen		
(8) Auxil	This depends on the machine tool builder specifications.	0 to 65535
(9) Life	Set the usage time (minutes), attachment count (No. of times attached to the spindle), or usage count (No. of holes drilled) for the life for each tool based on the data format set for "Method". The life is infinite when "0" is set.	Usage time: 0 to 4000 (min) No. of mounting times: 0 to 65000 (set) No. of uses: 0 to 65000 (set)

3. Setup Screen

3.5 Tool Life Management

(M system)

Display item	Details	Display range
(10) Used	<p>This displays the usage data for individual tools based on the method specified for the tool life management method.</p> <p>(Note) This data is not counted during machine lock, auxiliary function lock, dry run or for a single block.</p>	<p>Usage time: 0 to 4000 (min)</p> <p>No. of mounting times: 0 to 65000 (set)</p> <p>No. of uses: 0 to 65000 (set)</p>

(Note 1) The "Length compensation" and "Radius compensation" calculation/direct compensation amount setting/display range are as follows based on a combination of settings of "#1003 iunit (input unit)" and "#1041 I_inch (initial inch)".

#1003 iunit	#1041 I_inch	Setting/display range
B	0	-999.999 to 999.999
	1	-99.9999 to 99.9999
C	0	-999.9999 to 999.9999
	1	-99.99999 to 99.99999
D	0	-999.99999 to 999.99999
	1	-99.999999 to 99.999999
E	0	-999.999999 to 999.999999
	1	-99.9999999 to 99.9999999

3. Setup Screen

3.5 Tool Life Management

Menus (M system)

Menu	Details	Type	Reference
Group No.	This displays the data of a group when that group No. of tool life management data is set and the INPUT key is pressed. The group No. can be referred to in the group list.	A	"Designating a group No."
Line copy	Copies one line of tool life management data where the cursor is located.	C	"Copying/pasting the tool life data"
Line paste	The copied tool life management data is written to the data in the line where the cursor is located. If the copied data is changed after the menu Line copy is pressed, the data before changing is written when pasted. The data in the copied line can be pasted as many times as is required until new data is copied.	C	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. The first and the last line No. of the data to be erased is specified with a "/" separating the Nos. If the INPUT key is pressed without specifying a line, the data in the line where the cursor is located is erased.	A	"Erasing one line of tool life management data" "Designating and erasing a line"
Group change	This changes a group No. If a new group No. is set and the INPUT key pressed, the group No. changes. An error occurs if a pre-existing group No. is set.	A	"Changing a group No."
Horiz scroll	This scrolls the display of the tool life management data to the left and right. The items below display alternately each time the menu is pressed. 1. Tool No., ST, Mthd, L compen, R compen 2. Tool No., Auxil, Life, Used	C	
Prev group	Displays the previous group No. data.	C	
Next group	Displays the next group No. data.	C	
Group list	This displays the list of tool life data groups.	C	
Group regist	This creates a new group.	A	"Registering a group"
Group delete	This erases all tool life management data contained in the currently displayed group No.	A	"Erasing a group"

Operation method (Designating a group No.) (M system)

- (1) Press the **Group No.** menu. → The menu is highlighted.
- (2) Designate the group No. to be displayed.
12 **INPUT** → The tool life data of the designated group No. appears, and the cursor moves to the head of the data.

(Note) If a group No. that does not exist is designated, a message appears to confirm the creation of a new No. A new group is created if **Y** or **INPUT** is pressed.

Operation method (Changing a group No.) (M system)

- (1) Press the **Grp No. change** menu. → The menu is highlighted.
- (2) Designate the group No. after changing.
112 **INPUT** → The group No. changes to "112".

(Note) An error occurs if the group No. duplicates a pre-existing group No.

Operation method (Setting the tool life data) (M system)

- (1) Move the cursor to the data to be set using the **↑**, **↓**, **↑**, **↓**, **←** and **→** keys. → The menu is highlighted.
It is possible to move to the line after the registered line.
Set a tool No. for this line to newly register tool life management data.
- (2) Set a value.
20 **INPUT** → The set value displays.
The cursor moves one position to the right.

(Note 1) The other settings will be invalid when the tool ST (status) setting data are not set.

(Note 2) The same tool cannot be registered in more than one group.

(Note 3) If the tool No. is not set, the other data cannot be set.

(Note 4) Change the "Method" to initialize the related items.

Change the tool life management method (the 1st digit) to clear the "Life" and "Usage", and also change the units.

Change the tool radius compensation data (the 2nd digit) to clear the "Radius Compensation".

Change the tool length compensation data (the 3rd digit) to clear the "Length Compensation".

Figures after the decimal point are also changed in line with the specifications.

Operation method (Copying/pasting the tool life data) (M system)

(1) Move the cursor to the line to be copied.

(2) Press the menu [Line copy].



The menu is highlighted.

The background color of the copied data changes to light blue.

(The color changes even when scrolling horizontally.)

(3) Move the cursor to the line where the data is to be pasted.



Group No.		5			
#	Tool No.	ST	Mthd	L compen	R compen
1	87654321	0	110	-123456.789	-123456.789
2	101	1	101	123.456	123
3	102	2	012	100	123.456
4	103	3	020	1	-123.456
5					

(4) Press the [Line paste] menu.



The copied tool life management data is written to the data (excluding the tool No.) in the line where the cursor is located.

The background color returns to normal.

The cursor moves to "ST".

(Note 1) Once copied, the data is held until a new data item is copied.**(Note 2)** It is not possible to paste into a line for which a tool No. has not been set.**Operation method (Erasing one line of tool life management data) (M system)**

(1) Move the cursor to the line to be erased.

(2) Press the menu [Line clear] and [INPUT] keys.



The menu is highlighted.

A message displays confirming whether it is okay to erase the data.

The background color of the area to be erased changes to light blue.

(3) Press the [Y] or [INPUT] key.



One line of the selected life management data is erased and the menu highlight returns to normal.

The next line moves up after erasing.

Press a key other than [Y] or [INPUT] in order not to erase the data.

Operation method (Designating and erasing the multiple lines) (M system)

- (1) Press the menu [Line clear]. → The menu is highlighted.
- (2) Set the range to be erased by marking the first and last # Nos. with a "/", and press [INPUT] key.
122/125 [INPUT] → A message appears to confirm the erasing.
The background color of the area to be erased changes to light blue.
- (3) Press the [Y] or [INPUT] key.
Press a key other than [Y] or [INPUT] in order not to erase the data. → The tool life data corresponding to the designated # No. is erased, and the menu highlight returns to normal.
The next line after the erased range moves up.

Operation method (Registering a group) (M system)

- (1) Press the [Group regist] menu.
- (2) Set the No. of the group to be registered.
25 [INPUT] → A new group is created and the life management data displays containing no data.

(Note 1) An error occurs if the same group No. already exists.

(Note 2) The group is not registered if one of the operations below is performed after registering a new group No..

- If the application is exited without registering even 1 item of tool life data.
- If the screen is changed to that of other than the group unit display.
- The part system is changed.

Operation method (Erasing a group) (M system)

- (1) Move the cursor to the group No. to be erased.
- (2) Press the [Group delete] menu. → A message appears to confirm the erasing.
- (3) Press the [Y] or [INPUT] key. → All the tool life management data for the displayed group No. is erased and the previous group No. data displays.
Returns to the group list displays if all groups are erased.

3.5.3 Displaying the Life Management Data (L system: Tool life management I)

The tool life management data can be set and displayed. Use the / keys to scroll between screens if all of the registered tools cannot be displayed on one screen.

	[Time]		[Count]		[Status]	
#	Used	Life	Used	Life	A	B
1	46:36:12	0: 0	3000	0	0	0
2	46:47: 7	0: 0	3000	0	2	0
3	46:47: 7	0: 0	3000	0	5	0
4	46:47: 7	0: 0	3000	0	6	0
5	46:47: 7	0: 0	3000	0	7	0
6	46:47: 7	0: 0	3000	0	8	0
7	46:47: 7	0: 0	3000	0	9	0
8	46:47: 7	0: 0	3000	0	10	0
9	0:21:51	0: 0	3232	0	-95	12
10	0: 0: 0	0: 0	0	0	0	0
11	0: 0: 0	0: 0	0	0	0	0
12	0: 0: 0	0: 0	0	0	0	0
13	0: 0: 0	0: 0	0	0	0	0

Display items (L system)

Display item		Details		
(1) #		Tool No. The # No. is highlighted if the usage time reaches the life time or if the usage count exceeds the life count.		
(2) Time	Used	The integrated time the tool is used. This timer value is incremented during cutting.		0:0:0 to 99:59:59 (h:min:s)
	Life	Tool life time Set the service lifetime.		0:0 to 99:59(h:min) (0:0 = no warning given)
(3) Count	Used	The integrated count the tool is used. The count goes up when a tool is selected.		0 to 9999 (times)
	Life	Tool life count Set the service life count.		0 to 9999 (times) (0:0 = no warning given)
(4) Status	A (left side)	The tool life management status is indicated. 0: Not used 1: Current tool (tool being used) 2: Service lifetime (service life count) is exceeded.		0 to 2
	B (right side)	(Used by machine tool builder)		0 to 99

Menus (L system)

Menu	Details	Type	Reference
Line copy	Copies one line of tool life management data where the cursor is located.	C	"Copying/pasting the tool life data"
Line paste	The copied tool life management data is written to the data in the line where the cursor is located. If the copied data is changed after the menu key [Line copy] is pressed, the data before changing is written when pasted. The copied data can be pasted as many times as is required until new data is copied.	C	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. The first and the last line No. of the data to be erased is specified with a "/" separating the Nos.. If the [INPUT] key is pressed without specifying a line, the data in the line where the cursor is located is erased.	A	"Erasing one line of tool life management data" "Designating and erasing a line"

Operation method (Setting the tool life data) (L system)

- (1) Move the cursor to the data to be set using the     and  keys.

It is possible to move to the line after the registered line.

- (2) Set a value.
20 

→ The set value displays.
The cursor moves one position to the right.

Operation method (Copying/pasting the tool life data) (L system)

- (1) Move the cursor to the line to be copied.

- (2) Press the menu [Line copy].

→ The background color of the copied data changes to light blue.

- (3) Move the cursor to the line where the data is to be pasted.

- (4) Press the [Line paste] menu.

→ The copied tool life management data is written to the data in the line where the cursor is located.
The background color returns to normal.

(Note 1) Once copied, the data is held until a new data item is copied.

Operation method (Erasing one line of tool life management data) (L system)

- (1) Move the cursor to the line to be erased.
- (2) Press the menu [Line clear] and [INPUT] keys. → The menu is highlighted.
A message displays confirming whether it is okay to erase the data.
The background color of the area to be erased changes to light blue.
- (3) Press the [Y] or [INPUT] key. → One line of the selected life management data is erased and the menu highlight returns to normal.
Press a key other than [Y] or [INPUT] in order not to erase the data.
The next line moves up after erasing.

Operation method (Designating and erasing the multiple lines) (L system)

- (1) Press the menu [Line clear] → The menu is highlighted.
- (2) Set the erasing range by marking the first and last # Nos. with a "/", and press [INPUT] key.
122/125 [INPUT] → A message displays confirming whether it is okay to erase the data.
The background color of the area where the data is erased changes to light blue.
- (3) Press the [Y] or [INPUT] key. → The tool life data corresponding to the designated # No. is erased, and the menu highlight returns to normal.
Press a key other than [Y] or [INPUT] in order not to erase the data.
The next line after the erased range moves up.

(Note) If the [INPUT] key is pressed without setting a # No., the line at the cursor is erased.

3.5.4 Displaying the Tool Life Management Data in Group Units (L system: Tool life Management II)

The tool life management data of an arbitrary group is set and displayed. If the registered tools cannot be displayed on one screen, scroll the screen using the or key.

This screen is enabled only for tool life management II ("#1096 T_Ltyp" = 2).

Group:		1 Form:1Life:		300 (set)
#	Tool	Comp	Used (set)ST	
1	101	11	28	1
2	102	12	0	0
3	103	13	0	0
4	104	14	0	2
5	105	15	0	0
6				
7				
8				

By setting parameter "#1107 Tlfsc", it is possible to select the life management data display mode for multiple groups.

"#1107 Tlfsc" setting value	0	1	2
No. of display groups	1	2	4
Max. No. of registered tools	16	8	4

<Group 1 display mode> (#1107 Tlfsc = 0)

Group: 1 Form:1Life: 300 (set)				
#	Tool	Comp	Used (set)ST	#
1	101	11	28	1
2	102	12	0	0
3	103	13	0	0
4	104	14	0	2
5	105	15	0	0
6				14
7				15
8				16

<Group 2 display mode> (#1107 Tlfsc = 1)

Group: 1 Form:1Life: 300 (set)					Group: 2 Form:1Life: 200 (set)				
#	Tool	Comp	Used (set)ST	#	Tool	Comp	Used (set)ST	#	
1	101	11	28	1	201	21	11	1	
2	102	12	0	0	202	22	0	0	
3	103	13	0	0	203	23	0	0	
4	104	14	0	2	4				
5	105	15	0	0	5				
6					6				
7					7				
8					8				

3. Setup Screen

3.5 Tool Life Management

<Group 4 display mode> (#1107 Tlfsc = 2)

Group: 1 Form:1 Life: 300 (set)					Group: 2 Form:1 Life: 200 (set)				
#	Tool	Comp	Used (set)	ST	#	Tool	Comp	Used (set)	ST
1	101	11	28	1	1	201	21	11	1
2	102	12	0	0	2	202	22	0	0
3	103	13	0	0	3	203	23	0	0
4	104	14	0	2	4				

Group: 3 Form:0 Life: 30 s					Group: 4 Form:0 Life: 50 s				
#	Tool	Comp	Used (s)	ST	#	Tool	Comp	Used (s)	ST
1	301	31	5	1	1	401	41	5	1
2	302	32	0	0	2	402	42	0	0
3	3030	33	0	0	3	403	43	0	0
4					4				

Display items (L system)

<Group information>

Display item	Details	Setting range
(1) Group	Life management group No.	1 to 9999
(2) Form	This displays whether to control the currently displayed group in usage hours or usage count.	0 : Hours 1 : Times
(3) Life	This sets the tool life data for the currently displayed group. The following tool life data units display based on the control method. Usage time : (s) Usage count : (set)	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)

<Life management data within group>

Display item	Details	Setting range
(4) #	This displays whether the tool for which the # No. is highlighted is a life tool (ST=2) or a skip tool (ST=3).	
(5) Tool No.	This sets the tool No.	1 to 999999
(6) Comp No.	This sets the compensation No.	1 to 80
(7) Used	This sets the usage data at such times as when the tool is not an unused tool. This becomes "0" when the usage data is not set. The following usage data units display based on the control method. Usage time : (s) Usage count : (set)	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set) Setting can be omitted.
(8) ST	This sets the tool status. This becomes "0" when the tool status is not set. 0: Unused tool 1: Used tool 2: Normal life tool 3: Skipped tool	0 to 3 Setting can be omitted.

3. Setup Screen

3.5 Tool Life Management

Menus (L system)

Menu	Details	Type	Reference
Group No.	This displays the data of a group when that group No. of tool life management data is set and the INPUT key is pressed. The group No. can be referred to in the group list.	A	"Designating a group No."
Line copy	Copies one line of tool life management data where the cursor is located.	C	"Copying/pasting the tool life data"
Line paste	The copied tool life management data is written to the data in the line where the cursor is located. If the copied data is changed after the menu key Line copy is pressed, the data before changing is written when pasted. The copied data can be pasted as many times as is required until new data is copied.	B	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. The first line No. and the last line No. of the data to be erased is specified with a "/" separating the Nos. If the INPUT key is pressed without specifying a line, the data in the line where the cursor is located is erased.	A	"Erasing one line of tool life management data" "Designating and erasing a line"
Grp No. change	This changes a group No. If a new group No. is specified and the INPUT key pressed, the group No. changes. An error occurs if a pre-existing group No. is set.	A	"Changing a group No."
Group change	The group active area is changed if parameter "#1107 Tlfsc" is set to 1 or 2.	C	"Changing the active area for multiple group displays"
Multi group	Changes to the multiple group life management data display mode based on the parameter "#1107 Tlfsc" setting value.	C	
Group regist	This creates a new group and displays the life management data containing no data.	A	"Registering a group"
Group list	This displays the list of tool life data groups.	C	
Close	The multiple group life management data display mode is cancelled.	C	

Operation method (Designating a group No.) (L system)

- (1) Press the Group No. menu. → The menu is highlighted.
- (2) Designate the group No. to be displayed.
12 INPUT → The tool life data of the designated group No. appears, and the cursor moves to the head of the data.

(Note) If a group No. that does not exist is set, a message appears to confirm the creation of a new No.. A new group is created if Y or INPUT is pressed.
When creating a new group, set the method and life data at the end of the group No., separating the data with a "/". If the method and life data are omitted, a new group is created with method = 0 (usage time), and life data = 0.

Operation method (Changing a group No.) (L system)

- (1) Press the [Grp No. change] menu. → The menu is highlighted.
- (2) Designate the group No. after changing.
112 [INPUT] → The group No. changes to "112".

(Note) An error occurs if the group No. duplicates a pre-existing group No.

Operation method (Setting the tool life data) (L system)

- (1) Move the cursor to the data to be set using the  ,   keys.
It is possible to move to the line after the registered line.
Set a tool No. for this line to newly register tool life management data.
- (2) Set a value.
20 [INPUT] → The set value displays.
The cursor moves one position to the right.

(Note 1) It is not possible to set any other data if the tool No. and compensation No. have not been set.

Operation method (Copying/pasting the tool life data) (L system)

- (1) Move the cursor to the line to be copied.
- (2) Press the menu [Line copy]. → The background color of the copied data changes to light blue.
- (3) Move the cursor to the line where the data is to be pasted.
- (4) Press the [Line paste] menu. → The copied tool life management data is written to the data in the line where the cursor is located.
The background color returns to normal.
The cursor moves to "Tool No.".

(Note 1) Once copied, the data is held until a new data item is copied.

Operation method (Erasing one line of tool life management data) (L system)

- (1) Move the cursor to the line to be erased.
- (2) Press the menu [Line clear] and [INPUT] keys. → The menu is highlighted.
A message displays confirming whether it is okay to erase the data.
The background color of the area where the data is erased changes to light blue.
- (3) Press the [Y] or [INPUT] key. → One line of the selected life management data is erased and the menu highlight returns to normal.
Press a key other than [Y] or [INPUT] in order not to erase the data.
The next line moves up after erasing.

Operation method (Designating and erasing the multiple lines) (L system)

- (1) Press the menu [Line clear]. → The menu is highlighted.
- (2) Set the erasing range by marking the first and last # Nos. with a "/", and press [INPUT] key.
1/5 [INPUT] → A message displays confirming whether it is okay to erase the data.
The background color of the area where the data is erased changes to light blue.
- (3) Press the [Y] or [INPUT] key. → The tool life data corresponding to the designated # No. is erased, and the menu highlight returns to normal.
Press a key other than [Y] or [INPUT] in order not to erase the data.
The next line after the erased range moves up.

(Note) If the [INPUT] key is pressed without setting a # No., the line at the cursor is erased.

Operation method (Registering a group) (L system)

- (1) Press the [Group regist] menu.
- (2) Set the No. of the group to be registered.
25/1/3000 [INPUT] → A new group is created and the life management data displays containing no data.

- (Note 1)** If the method and life data are omitted, a new group is created with method = 0 (usage time), and life data = 0.
- (Note 2)** An error occurs if the same group No. already exists.
- (Note 3)** The group is not registered if one of the operations below is performed after registering a new group No.
 - If the application is exited without registering even 1 item of tool life data.
 - If the screen is changed to that of other than the group unit display.
 - The part system is changed.

3. Setup Screen

3.5 Tool Life Management

Operation method (Changing the active area for multiple group displays) (L system)

(1) Press the **Group change** menu.



The cursor indicating the active status moves to the next group.

Group: 1 Form:1Life: 300 (set)				Group: 2 Form:1Life: 200 (set)				
#	Tool	Comp	Used (set) ST	#	Tool	Comp	Used (set) ST	
1	101	11	28	1	201	21	11	1
2	102	12	0	2	202	22	0	0
3	103	13	0	3	203	23	0	0
4	104	14	0	4				
5	105	15	0	5				
6				6				
7				7				
8				8				

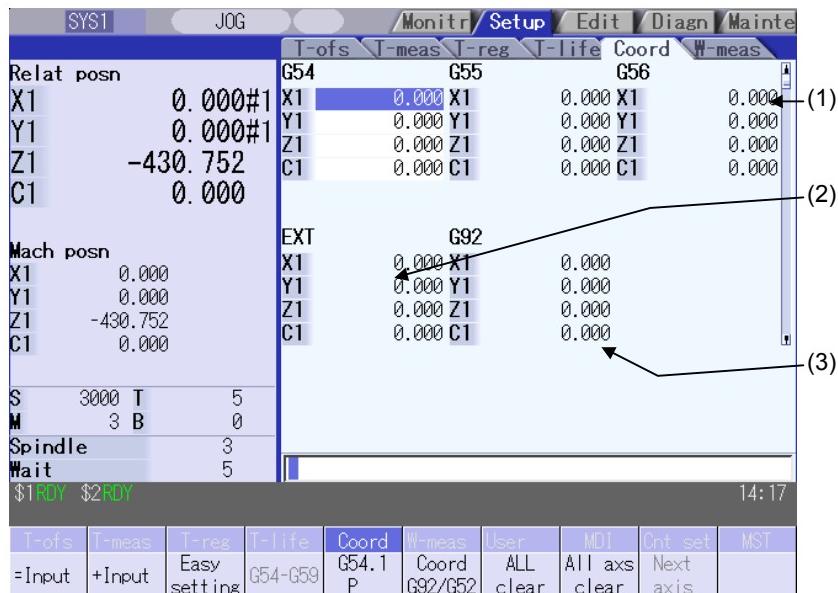
3. Setup Screen

3.6 Workpiece Coordinate System Offset

3.6 Workpiece Coordinate System Offset

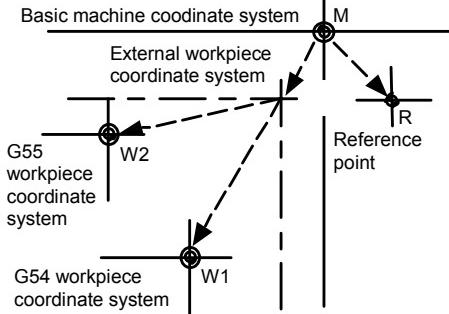
This function allows the user to set and display the coordinate system offset controlled by the NC. Using the option, the number of coordinate system offset sets can be increased by 48 or 96 sets.

(Note) The G92/G52 coordinate system offset cannot be set.



Display items

Display item	Details
(1) Coordinate system offset area	This sets and displays the offset amount for the workpiece coordinate system (G54 - G59), or the extension workpiece coordinate system (G54.1Pn). Use the menu operation or page change key to specify which workpiece coordinate system offset to display or set. The workpiece coordinate system offset amount data can be set in absolute or additional mode.
(2) EXT offset area	This displays or sets the offset amount for the external workpiece system.
(3) G92/G52 offset area	This displays the offset amount for G92 or the local coordinate system. The offset amount of the corresponding local coordinate system (G52) is displayed only when the cursor is at G54 to G59.



CAUTION

If the tool compensation amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in next block or after several subsequent blocks.

3. Setup Screen

3.6 Workpiece Coordinate System Offset

Menus

Menu	Details	Type	Reference
= Input	This inputs the offset amount with the absolute mode.	C	3.6.1 Setting the Coordinate System Offset
+ Input	This inputs the offset amount with the additional mode.	C	
Easy setting	This sets the workpiece coordinate system offset so that the current machine coordinate becomes the workpiece coordinate zero point. Only the axis at the cursor position is set.	C	3.6.3 Setting the Work Piece Coordinate Origin
G54-G59	This displays the G54 - G59 workpiece coordinate system offset amount. The cursor moves to the G54 offset. This menu can be used when the G54 – G59 offsets are not displayed.	C	3.6.1 Setting the Coordinate System Offset
G54.1 P	Enter the P number displayed at the screen to display the extension workpiece coordinate (G54.1 Pn) offset in the coordinate system offset area. This menu is not displayed if the extension workpiece coordinate system offset option is disabled. If the local coordinate system offset (G52) displays in the G92/G52 area, the display changes to G92.	A	
Coord G92/G52	This displays the G92 or G52 coordinate system offset amount. The G92 offset data is always displayed when the cursor is not at the G54 to G59 offset data.	C	
All clear	All coordinate system offset amounts for all axes are erased with the exception of G92 and EXT.	A	3.6.2 Erasing the Coordinate System Offset Amount
All axis clear	This erases the local offset data for all axes corresponding to the offset data of the coordinate system where the cursor is located.	A	
Next axis	This can be selected when the number of enabled axes is 6 or over. The displayed axes are changed to axes 1 – 5, and axis 6 and over. (Note) This displays when there are 6 or more axes.	C	

3.6.1 Setting the Coordinate System Offset

Operation method (Setting the workpiece coordinate system G54 - G59 offset amount)

- (1) Press the **G54-G59** menu. → The G54 - G59 workpiece coordinate system offset displays.

 - (2) Use the (,) keys to move the cursor to the workpiece coordinate system offset to be set.
Use the , page keys to change the coordinate system display.
Refer to the "Changing the offset amount using the page change keys (previous page: , next page:)" section in "3.6.4 Changing the coordinate system display" for further details.

 - (3) Use the , keys to move the cursor to the axis for which data is to be set.

 - (4) Set the offset amount.
122 **INPUT** → The set data displays and the cursor moves to the next data.
This setting can be made by pressing the menu **=INPUT** key instead of the **INPUT** key.

 - (5) Set other data using the same method.
- (Note)** It is possible to perform additional input by pressing the menu **+INPUT** key instead of the **INPUT** or menu **=INPUT** keys.
- [Ex.]** If the original data is 122.000:
1.234 [+INPUT] → 122.000 + 1.234 = 123.234

Setting the external coordinate system offset amount

Set the external coordinate system offset amount to keep the current workpiece coordinate system offset amounts from G54 to G59, and also apply an offset to the entire system.
Furthermore, it is also possible to use the data transfer function to write data directly to the external coordinate system offset (EXT).

3.6.2 Erasing the Coordinate System Offset Amount

Operation method (Erasing the coordinate system (excluding G92) offset amount where the cursor is displayed for all axes.)

- (1) Press the menu **All axs clear** menu. → The menu is highlighted.
A message displays confirming whether it is okay to erase the data.
- (2) Press the **Y** key. → All of the coordinate system indicated by the cursor is cleared to zero.
In addition, all axes data of the local offset (G52) for the coordinate system will be erased.

Operation method (Erasing all axis offset data of all coordinate systems (excluding G92 and EXT))

- (1) Press the menu **All clear** menu. → The menu is highlighted.
A message displays confirming whether it is okay to erase the data.
- (2) Press the **Y** key. → All coordinate system data is erased.
In addition, all axes data of the local offset (G52) for the G54 to G59 coordinate systems will be erased.

(Note) G92 data cannot be erased.

3.6.3 Setting the Workpiece Coordinate Origin

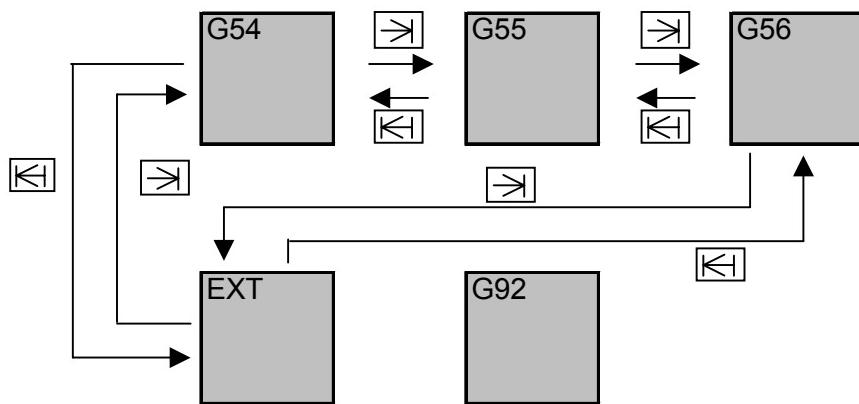
Press the menu **Simple settings** key to set the coordinate system offset so that the current machine position (for all axes) becomes the workpiece coordinate origin. It is only possible to set those axes where the cursor is located.

(Note) When the menu **Easy setting** is pressed for an axis, the local offset (G52) data of the axis will be also erased.

3.6.4 Changing the Coordinate System Display

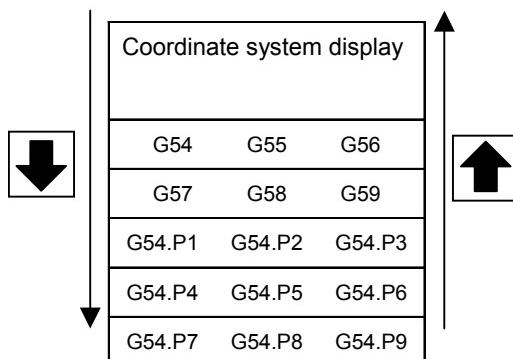
Use the   tab keys to change the coordinate system offset cursor position.

Press the Tab key to change the cursor position.



Changing the coordinate system offset using the page change keys (previous page: , next page: )

Use the page change keys to change the coordinate system offset display as shown below.



An option is required for the G54.P1 - P96 workpiece coordinate system offset display.

3. Setup Screen

3.7 Workpiece Measurement

3.7 Workpiece Measurement

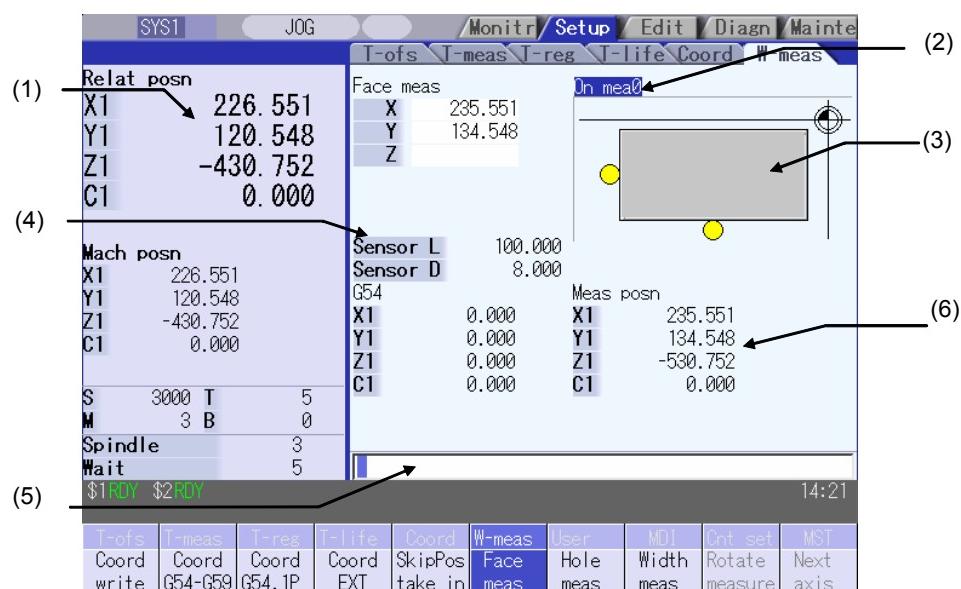
Move the sensor attached to the spindle using manual feed or handle feed to contact the workpiece, measure the coordinate position, and then set that measurement result for the workpiece coordinate system offset amount.

There are three measurement patterns: surface measurement, hole measurement, width measurement, and rotation measurement.

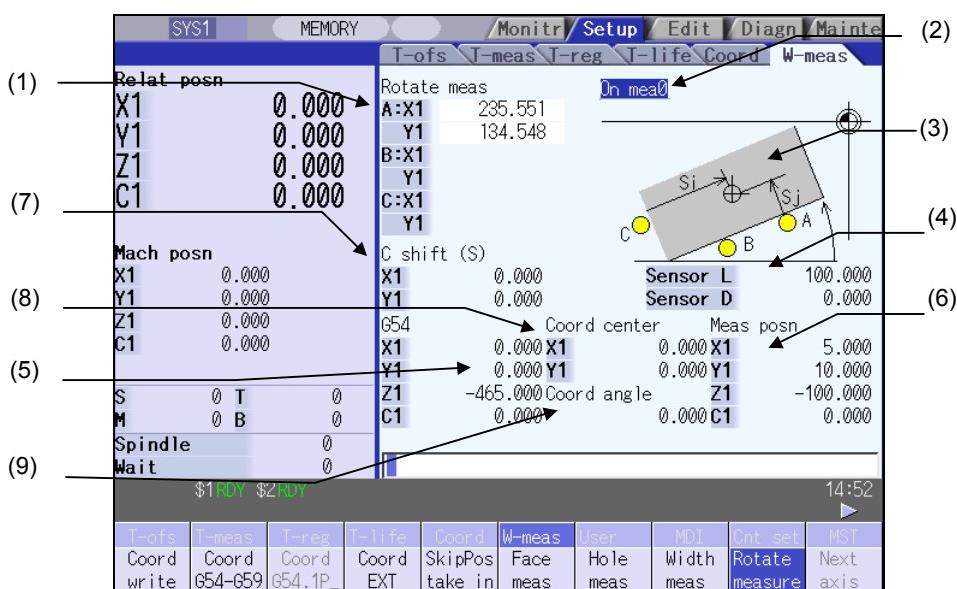
For the rotation measurement, the measurement result is set in the workpiece offset (rotation center) and parameters "#8624 Coord rot centr(V)", "#8626 Coord rot vctr(H)", and "#8627 Coord rot angle".

(Note) The M system is equipped with the workpiece measurement function. A workpiece position measurement option is required.

- For surface measurement (As for the hole or width measurement, the guide drawing differ.)



- For rotation measurement



Display items

Display item	Details								
(1) Measurement counter	<p>Displays the measurement position. The measurement axis is compatible with base system parameters "#1026 base_I", "#1027 base_J", and "#1028 base_K". (Hereafter indicated as I=X, J=Y, and K=Z axes in this manual.) The measurement position becomes blank when setting the coordinate system offset amount, resetting the NC, or changing the measurement mode (when face meas, hole meas, width meas, or rotate meas menu is selected). The display contents differ depending on the measurement pattern (surface measurement, hole measurement, width measurement, or rotation measurement).</p>								
Surface measurement counter	Displays the calculated measurement position from the skip position for each axis (X-, Y-, Z-axes).								
Hole measurement counter	Displays 3 (A, B, C) measurement positions (X-, Y-axes).								
Width measurement counter	Displays 2 (A, B) measurement positions (X-, Y-, Z-axes).								
Rotation measurement counter	Displays 3 (A, B, C) measurement positions (X-, Y-axes).								
(2) Manual measurement status display	Displays the manual measurement status. Refer to the "Manual measurement status display" section in "3.3.1 Tool Measurement (M system)" for further details.								
(3) Guide drawing	Displays the measurement image. The contents of the guide drawing differ depending on the measurement pattern (surface measurement, hole measurement, width measurement, or rotation measurement).								
(4) Sensor length and diameter	<p>Sensor length : Displays the length to the tip of the touch sensor. ("8701 Tool Length" setting value)</p> <p>Sensor diameter : Displays the diameter of the ball at the tip of the touch sensor. ("8702 Tool Dia" setting value)</p>								
(5) Coordinate system offset	Displays the currently selected coordinate system offset.								
(6) Measurement position counter	<p>Displays the measurement position for all axes. X axis : X axis machine position + sensor radius +center compensation (Horizontal) Y axis : Y axis machine position + sensor radius +center compensation (Vertical) Z axis : Z axis machine position - sensor length 4th axis and over : Respective machine position</p> <div style="text-align: center; margin-left: 100px;"> <table border="0"> <tr> <td>Sensor length</td> <td>: "#8701 Tool Length"</td> </tr> <tr> <td>Sensor radius</td> <td>: "#8702 Tool Dia"/2</td> </tr> <tr> <td>Center compensation (H)</td> <td>: "#8703 OFFSET X"</td> </tr> <tr> <td>Center compensation (V)</td> <td>: "#8704 OFFSET Y"</td> </tr> </table> </div>	Sensor length	: "#8701 Tool Length"	Sensor radius	: "#8702 Tool Dia"/2	Center compensation (H)	: "#8703 OFFSET X"	Center compensation (V)	: "#8704 OFFSET Y"
Sensor length	: "#8701 Tool Length"								
Sensor radius	: "#8702 Tool Dia"/2								
Center compensation (H)	: "#8703 OFFSET X"								
Center compensation (V)	: "#8704 OFFSET Y"								
(7) Center shift amount	Displays the shift amount of the coordinate rotation center.								
(8) Coordinate rotation center	Displays the coordinates that are the center during coordinate rotation. This is the setting value of "#8623 Coord rot centr (H)" and "#8624 Coord rot centr (V)".								
(9) Coordinate rotation angle	Displays the rotation angle during coordinate rotation. This is the setting value of "#8627 Coord rot angle".								

3. Setup Screen

3.7 Workpiece Measurement

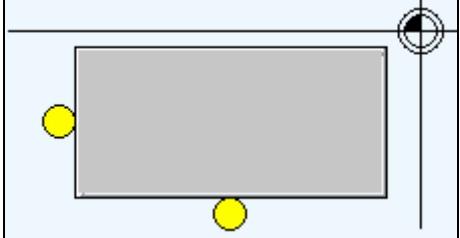
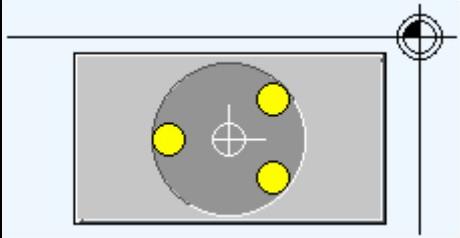
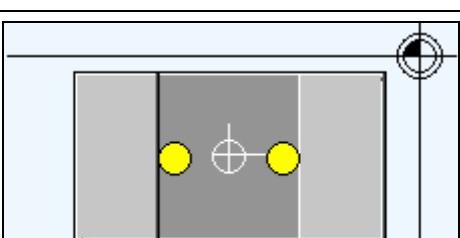
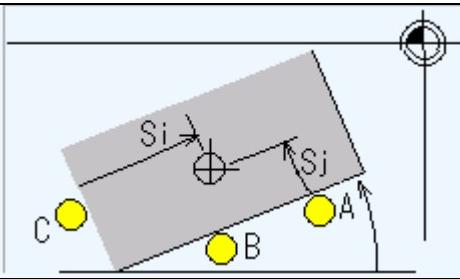
Menus

Menu	Details	Type	Reference
Coord write	The results calculated from the measurement counter are set in the displayed workpiece coordinate system offset. Only the axis for which a value is displayed in the measurement counter can be set. (Note) If the workpiece coordinate system to be set is G54 to G59, the local coordinate system offset value will be zero. (Only for the measured axis.)	C	
Coord G54-G59	This selects the displayed workpiece coordinate system from the sub-menu (G54 - G59). Select the workpiece coordinate system to display the selected workpiece coordinate system offset in the coordinate system offset section. (Perform the offset amount setting at the menu Coord write key.)	C	
Coord G54.1 P	Input the P number to display the selected extension workpiece coordinate system (G54.1 Pn) offset in the coordinate system offset section. (Perform the offset amount setting at the menu Coord write key.) This menu does not display if the extension workpiece coordinate system offset option is disabled.	A	
Coord EXT	This displays the external workpiece coordinate system offset in the coordinate system offset section. (Perform this setting at the menu Coord write key.)	C	
SkipPos take in	This creates a false signal when performing simple measurement (measurement without using the touch sensor) and reads the skip position. Press this menu to display the measurement position measured from the machine position of the axis moved last (axis 1 or 2) at the measurement counter.	B	
Face meas	This enables surface measurement. Surface measurement is possible when the power is turned ON.	B	3.7.1 Carrying Out Surface Measurement
Hole meas	This enables hole measurement. (The cursor moves to the measurement counter point A.)	B	3.7.2 Carrying Out Hole Measurement
Width meas	This enables width measurement. (The cursor moves to the measurement counter point A.)	B	3.7.3 Carrying Out Width Measurement
Rotate meas	This enables rotation measurement. (The cursor moves to the measurement counter point A.)	B	3.7.4 Carrying Out Rotation Measurement
Next axis	This changes the axes displayed at the coordinate system offset and measurement position counter from axis 1 - 5, and axis 6 and over. (Note) This displays when the number of enabled axes is 6 or over.	C	
Center shift	This sets the center shift amount. (The cursor moves to the 1st axis of "center shift (S)" when this is selected.)	A	3.7.4 Carrying Out Rotation Measurement
Rotate center	This sets the coordinate rotation center. (The cursor moves to the 1st axis of "coordinate rotation center" when this is selected.)	A	
Rotate angle	This sets the coordinate rotation angle. (The cursor moves to the "coordinate rotation angle" when this is selected.)	A	

3. Setup Screen

3.7 Workpiece Measurement

Details of the "Measurement counter" and "Guide drawing" display areas

Menu	Measurement counter	Guide drawing
Face meas	Face meas X 235.551 Y 134.548 Z	
Hole meas	Hole meas A:X 228.099 Y 127.959 B:X 228.099 Y 186.014 C:X Y	
Width meas	Width meas A:X 244.308 Y Z B:X 364.732 Y Z	
Rotate meas	Rotate meas A:X1 235.551 Y1 134.548 B:X1 Y1 C:X1 Y1	

3.7.1 Carrying Out Surface Measurement

Outline

When carrying out surface measurement, the position of each axis is measured and the measurement results are set in the workpiece coordinates system offset. The measurement position displays at the measurement counter.

<Measurement using the touch sensor>

Measurement counter X = X axis skip position + sensor radius (**Note**)

Measurement counter Y = Y axis skip position + sensor radius (**Note**)

Measurement counter Z = Z axis skip position - sensor length

(Note) The sign (+ and -) changes depending on the direction of the axis moved last.

Item	Reference
Sensor radius	"#8702 Tool Dia"/2
Sensor length	"#8701 Tool Length "

<Simple measurement (measurement without using touch sensor)>

Measurement counter X : X axis measurement position

Measurement counter Y : Y axis measurement position

Measurement counter Z : Z axis measurement position

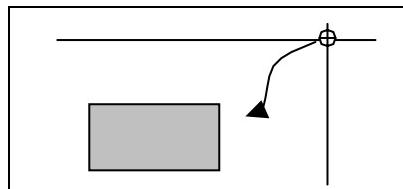
Operation method

- (1) Press the **Face meas** menu. → The menu is highlighted.

- (2) Perform the reference position return command, etc. to position the tool at the basic point.

- (3) Turn ON the measurement switch on the machine operation board. → The message "On meas" appears.

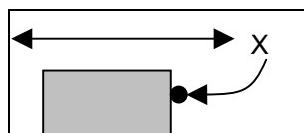
- (4) Move the tool near the workpiece using manual feed and manual handle feed.



<With the touch sensor>

- (5) Move the tool in the X-direction until the sensor contacts the workpiece.

Upon contact, the axis automatically contacts the workpiece again. The measurement position measured from the skip position displays in the measurement counter X axis section.



<Without the touch sensor (simple measurement)>

- (5) Move the tool in the X-direction to the arbitrary position and press the menu **SkipPos take in**. → The skip position is calculated and the result displays in the measurement counter X axis section.
- (6) Select the workpiece coordinate system offset in which the measurement data will be set.
(Example) Press the menus **Coord G54-G59** **G55** to select G55.
- (7) Press the **Coord write** menu. → The value achieved by adding or subtracting the external workpiece offset to or from the X axis measurement position based on the "#1237 set09 BIT0" value (external workpiece offset symbol conversion) is set in workpiece coordinate system selected at (6).
The measurement counter displays blank.
- (8) Carry out the operations in steps (4) to (7) in the same way for the Y and Z axes.
- (9) Return the tool to the reference position, and turn the measurement switch OFF. → The message "On meas" disappears.

3.7.2 Carrying Out Hole Measurement

Outline

When carrying out hole measurement, three positions (A, B, and C) are measured, and the hole center position calculated from the three measured positions is set in the workpiece coordinate system offset. The measurement position displays at the measurement counter.

<Measurement using the touch sensor>

Measurement counter X = X axis skip position
Measurement counter Y = Y axis skip position

<Simple measurement (measurement without using touch sensor)>

Measurement counter X = X axis machine position + center compensation (H) + skip past amount
(Horizontal axis) **(Note)**

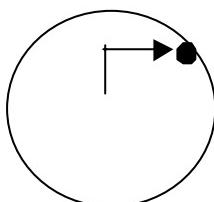
Measurement counter Y = Y axis machine position + center compensation (V) + skip past amount
(Vertical axis) **(Note)**

(Note) The skip past amount is added for only the axis that moved last.

The sign (+ or -) of the past amount depends on the movement direction of the axis.

Item	Reference
Center compensation (H)	"#8703 OFFSET X"
Center compensation (V)	"#8704 OFFSET Y"
Skip past amount (horizontal axis)	"#8707 Skip past amout (H)"
Skip past amount (vertical axis)	"#8708 Skip past amout (V)"

Operation method

- (1) Press the **Hole meas** menu. → The menu is highlighted and the cursor displays at point A. Use the **↑**, **↓** keys to move to points B and C.
- (2) Perform the reference position return command, etc. to position the tool at the basic point.
- (3) Turn ON the measurement switch on the machine operation board. → The message "On meas" appears.
- (4) Move the tool into the hole using manual feed and manual handle feed.
- <With the touch sensor>
- (5) Position the tool against the inner wall of the hole. Contact is performed by moving a single axis. →
- 
- Upon contact, the axis automatically contacts the hole wall again. The skip position displays in the measurement counter point A, X and Y axis section. The cursor moves to point B. For point C, the cursor moves to point A.
- <Without the touch sensor (simple measurement)>
- (5) Move the tool in the X-direction to the arbitrary position and press the menu **SkipPos take in**. → The skip position is calculated and the result displays in the measurement counter X axis section. The cursor moves to point B. For point C, the cursor moves to point A.
- (6) Measure points B and C in the same way.
- (7) Select the workpiece coordinate system offset in which the measurement data will be set.
(Example) Press the menus **Coord G54-G59** **G55** to select G55.
- (8) Press the **Coord write** menu. → The hole center position is measured, and based on the "#1237 set09 BIT0" value (external workpiece offset symbol conversion), value achieved by adding or subtracting the external workpiece to or from the measurement result is set in workpiece coordinate system selected at (7). The measurement counter displays blank.
- (9) Return the tool to the reference position, and turn the measurement switch OFF. → The message "On meas" disappears.

3.7.3 Carrying Out Width Measurement

Outline

When carrying out width measurement, two positions (A, and B) are measured, and the width center position calculated from the two measured positions is set in the workpiece coordinate system offset. The measurement position displays at the measurement counter.

<Measurement using the touch sensor>

Measurement counter X = X axis skip position

Measurement counter Y = Y axis skip position

Measurement counter Z = Z axis skip position - sensor length

<Simple measurement (measurement without using touch sensor)>

Measurement counter X = X axis machine position + center compensation (H) + skip past amount
(Horizontal axis) (**Note**)

Measurement counter Y = Y axis machine position + center compensation (V) + skip past amount
(Vertical axis) (**Note**)

Measurement counter Z = Z axis machine position - sensor length

(Note) The skip past amount is added for only the axis that moved last.

The sign (+ or -) of the past amount depends on the movement direction of the axis.

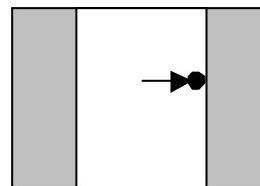
Item	Reference
Sensor length	"#8701 Tool Length"
Center compensation (H)	"#8703 OFFSET X"
Center compensation (V)	"#8704 OFFSET Y"
Skip past amount (horizontal axis)	"#8707 Skip past amout (H)"
Skip past amount (horizontal axis)	"#8708 Skip past amout (V)"

Operation method

- (1) Press the **Width meas** menu. → The menu is highlighted and the cursor displays at point A. Use the **↑**, **↓** keys to move to points A and B.
- (2) Perform the reference position return command, etc. to position the tool at the basic point.
- (3) Turn ON the measurement switch on the machine operation board. → The message "On meas" appears.
- (4) Move the tool to the center of the groove using manual feed or manual handle feed.

<With the touch sensor>

- (5) Position the tool against the inner wall of the groove. Contact is performed by moving a single axis.



Upon contact, the axis automatically contacts the groove wall again. The skip position displays in the measurement counter point A.

The cursor moves to point B. For point B, the cursor moves to point A.

<Without the touch sensor (simple measurement)>

- (5) Move the tool to the arbitrary position and press the menu **SkipPos take in**.



The skip position is calculated and the results displays in the measurement counter X axis and Y axis section.

The cursor moves to point B. For point B, the cursor moves to point A.

- (6) Similarly, position the tool against the opposite side.



Upon contact, the axis automatically contacts the groove wall again. The skip position displays in the measurement counter point B.

- (7) Select the workpiece coordinate system offset in which the measurement data will be set.

(Example) Press the menus
Coord G54-G59 **G55** to select G55.

- (8) Press the **Coord write** menu.



The width center position is measured, and based on the "#1237 set09 BIT0" value (external workpiece offset symbol conversion), value achieved by adding or subtracting the external workpiece offset to or from the measurement result is set in workpiece coordinate system offset G55 (coordinate system selected at (7)). The measurement counter displays blank.

- (9) Carry out the operations in steps (4) to (8) in the same way for the Y and Z axes.

- (10) Return the tool to the reference position, and turn the measurement switch OFF.



The message "On mea" disappears.

Edit Screen

4. Edit Screens

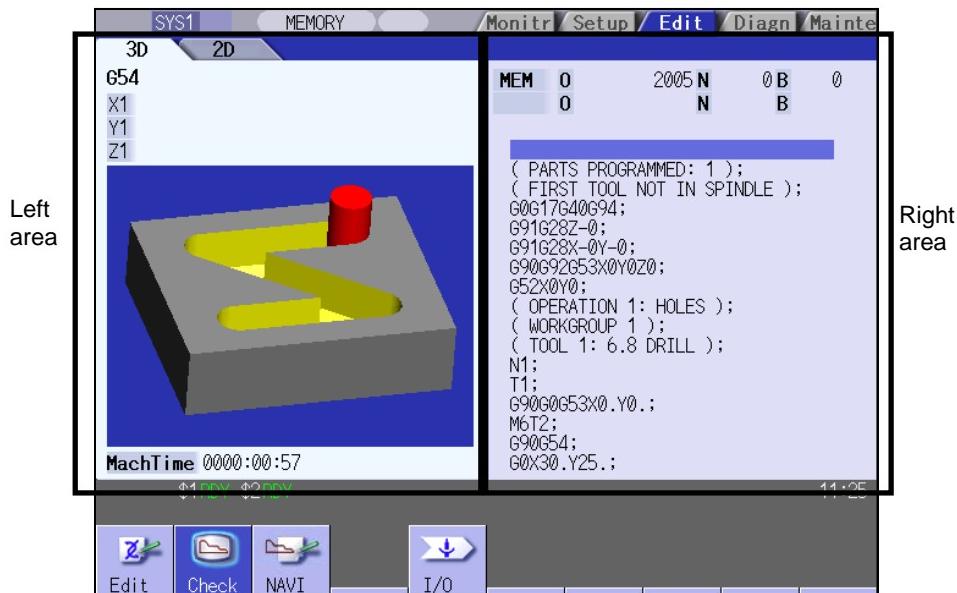
4.1 Screen Configuration

4. Edit Screens

The Edit screen is used to edit the machining program (adding, erasing and changing), perform checks, and input/output data.

4.1 Screen Configuration

The Edit screen is configured as shown below.



Menus

Menu	Details	Type	Reference
Edit	This edits the machining program.		4.2 Program Editing
Check	This checks the program. This is used to check the machining program without performing automatic operation. (1) Program check (2D) This displays a graphic drawing of the machining program movement path. (2) 3D solid graphic check This displays a solid graphic drawing of the workpiece shape and tool movement during the cutting process in the machining program. This menu does not display if there is no program check function option.		4.3 Program Check (2D) 4.4 Program Check (3D)
NAVI	This creates the part program simply. Refer to the following manuals for detail. 700 Series Simple Programming Function NAVI MILL Instruction Manual (IB-1500144(ENG)) 700 Series Simple Programming Function NAVI LATHE Instruction Manual (IB-1500146(ENG))		
I/O	This performs the machining program input and output between the NC internal memory and the external input/output device.		4.5 Program Input/Output

4.2 Program Editing

This is used to edit (add, erase, change) the machining programs in the NC memory, HD, memory card (front IC card), DS(compact flash) or FLD, and to create new programs.

This function is used for three types of program: machining program, MDI program and fixed cycle program. Press the main menu **Edit** key to display the program found when performing an operation search (MDI program in MDI mode).

The contents of the left area depends on the display type:

- Check display type :Enables to edit a program confirming the program check screen.
- Multi-program display type :Enables to edit two programs using left and right editing areas.
- G-code guidance display type :Enables to edit a program referring to the G code guidance.

There are two types of editing available: regular editing and mass-editing.

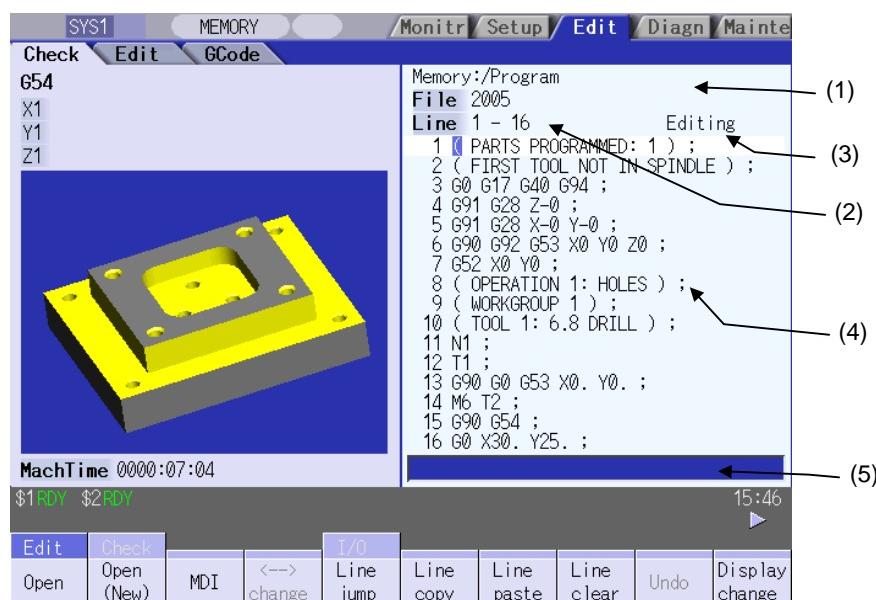
With mass-editing, up to a 2GB-sized file can be edit.

The specification and restrictions are different from those with the regular editing.

Mass-editing is available only with FCU7-DA4xx/DA3xx.

Mass-editing is applied when the following conditions are satisfied.

- When the storage destination for the program to be opened is either HD, FLD, or memory card.
- When a file size is 1.0MB or larger. (When the parameter "#8910 Edit Undo" is set to "0", 2.0MB or larger.)



Display items

Display item	Details
(1) Path display	This displays the path for the open program file. (Ex.) Memory: /program When the path is too long, the characters exceeding the 37 characters (1-byte code) can not be displayed.
(2) Program name Top display line Last display line	[Program name (file)] This displays the file name of the program currently being edited. This displays "MDI" when the MDI program name is being edited. [Top display line, Last display line] This displays the line number for the first and last line of the currently displayed program.
(3) Edit type display Current edit display "Editing" Insert mode display "INS"	[Edit type display] This displays "EX" in mass-editing. [Current edit display "Editing"] This displays when performing edit operations after displaying the program. [Insert mode display "INS"] This displays when pressing the INSERT key and changing to the insert mode.
(4) Line number Program display	[Line number] This displays the last 3 digits of the program line number. [Program display] This displays the contents of the program (machining program, MDI program) currently being edited.
(5) Input area	This inputs the program line number and search character string.

Menus

Menu	Details	Type	Reference
Open	This edits and references the existing programs. When the program number is designated and the INPUT key is pressed, the program contents appear and can be edited.	A	4.2.2 Editing a Machining Program
Open (New)	This creates a new program. When the program number is set and the INPUT key is pressed, a new program is created.	A	4.2.1 Creating a New Machining Program
MDI	This edits the MDI program. When this menu key is pressed, the MDI program appears and can be edited.	A	4.2.3 Editing MDI Program
↔ change	This switches the active area between left and right editing areas. Editing can be done in the active area. This menu can be used with the multi-program display type.	C	4.2.7 Changing the Display
Line jump	When the line number is set and the INPUT key is pressed, the cursor moves to that line number. This menu cannot be selected during mass-editing.	A	4.2.8 Designating an Arbitrary Line
Line copy	This copies the designated line (multiple lines can be copied.) This menu cannot be selected during mass-editing.	A	4.2.14 Copying/Pasting Data
Line paste	This inserts the copied line at the line before the cursor. This menu cannot be selected during mass-editing.	C	
Line clear	This erases the designated line (multiple lines can be erased.) This menu cannot be selected during mass-editing.	A	4.2.11 Deleting Data
Undo	This returns the contents of the program to that prior to saving and display. This menu cannot be selected when parameter "#8910 Edit Undo" is set to "0". This menu cannot be selected during mass-editing.	C	4.2.15 Undoing Program Changes
Display change	This switches the display type.	C	B
Comment nondisp	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	B	
String search	When the character string is designated and the INPUT key is pressed, that character string is searched for. This menu cannot be selected during mass-editing.	A	4.2.12 Searching for Character Strings
String replace	If the character string to be searched for and the character string to be replaced are separated with a "/" and designated, when the INPUT key is pressed, the character string is replaced. This menu cannot be selected during mass-editing.	A	4.2.13 Replacing Character Strings
Miss warning	This enables the input mistake check for the program being edited. This menu cannot be selected during mass-editing.	B	4.2.16 Correcting/Displaying Input Mistakes
Next miss	This moves the cursor to the next input mistake warning location. This menu cannot be selected during mass-editing.	C	
MDI regist	This registers the MDI program in the memory. This can be performed only when the MDI program is displayed.	A	4.2.3 Editing MDI Program
Erase file	This deletes the programs. When the name of the program to be erased is designated and the INPUT key is pressed, the designated file is deleted.	A	4.2.5 Deleting a File

4.2.1 Creating a New Machining Program

Operation method

- (1) Press the menu [Open (New)]. → The following menu appears.
The list appears as a pop-up window.
- | | | | | | | | | | |
|--------|----|--|-------------|----|-----|--|-------------|-------------|-------|
| Memory | HD | | Memory card | DS | FLD | | List update | Sort change | Close |
|--------|----|--|-------------|----|-----|--|-------------|-------------|-------|
- (2) Select a device.
(Ex.) Menu [Memory] → The selected device name and directory (Memory:/Program) appear in the Device name, Directory display column.
For the devices other than memory, root directory is selected.
- (3) Input the file name for the program to be newly created and press the [INPUT] key.
(Ex.) 100 [INPUT] → If a program can be newly created, a program containing only EOR is created.
The list display is closed.
-
- (4) Edit a machining program. → Refer to "4.2.6 Edit Operations" and later.
- (5) Press the [INPUT] key. → The created machining program is saved to the device.

(Note 1) An error occurs if an existing program No. is set.

(Note 2) The texts in parentheses () at the top block of the program is the comment.

(Note 3) The existing file cannot be set.

(Note 4) The characters that can be used for the file name and directory path are 1-byte number, 1-byte capital alphabetical letters, and 1-byte symbols recognized by the system.
Note that the following characters cannot be used.

!, /, :, "," (comma), *, ?, "<", ">", a to z (small letters)

In addition, the following cases cannot be treated as the file name.

- When the extension is such as "\$\$\$", "\$\$0", "\$\$1", "\$\$2", "\$\$3", "\$\$4", "\$\$5", "\$\$6", "\$\$7", "\$\$8", "\$\$9".
- When the file name is 1-byte character "0" (zero).

(Note 5) Creation of a program is not possible for a program with 33 or more file name characters.

4.2.2 Editing a Machining Program

Operation method

- (1) Press the **Open** menu. → The following menu appears.
The list appears as a pop-up window.

Memory	HD		Memory card	DS	FLD		List update	Sort change	Close
--------	----	--	-------------	----	-----	--	-------------	-------------	-------

- (2) Select a device.
(Ex.) Menu **Memory** → The selected device name and directory (memory: /program) appear in the Device name, Directory display column.
For the devices other than memory, root directory is selected.

- (3) Use the **↑**, **↓**, **↑**, **↓** keys to align the cursor with target machining program.

The name of the machining program to be edited can be input in the input area.

- (4) Press the **INPUT** key. → The program appears at the top if the file can be opened.
The cursor moves to the head character of the program. The mode enters the overwrite mode.
The list display is closed.

```

Memory:/Program
File: 348
Line: 1 - 16
1 G04P1000;
2 G00 X100 Y200 Z300;
3 G00 X300 Y200 Z250;
4 M3 S1000;
5 M6 T5;
6 N10;
7 G90 G9 X0 Y0 Z0;
8 Z5;
9 G00 X100 Y200 Z250;
10 M05;
11 F1000 S30000;
12 M3;
13 N20;
14 G41 D9;
15 G3 Z-20, I20, P3, ;
16 G1 X90, Y100, F1000;

```

- (5) Edit a machining program. → Refer to "4.2.6 Edit Operations" and later.

- (6) Press the **INPUT** key. → The edited machining program is saved to the device.

(Note 1) An error occurs if a nonexistent program No. is set.

(Note 2) If the selected program is running or program restarting, it can be displayed but not edited.
An error occurs when the data is set or the **INPUT** key is pressed.

(Note 3) The fixed cycle program list displays when basic common parameter "#1166 fixpro" is set to "1".

(Note 4) Editable size differs depending on each device. When the editable size is exceeded, the message "Can't edit because of size over" appears.

(Note 5) "Loading" is displayed in flickering until the file is opened.

(Note 6) Editing is not possible for a program with 33 or more file name characters.

4.2.3 Editing MDI Program

Operation method

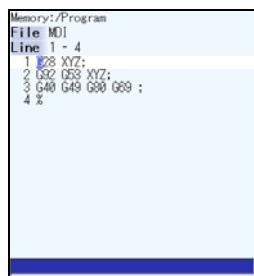
(1) Press the menu [MDI].



The menu is highlighted.

The MDI program is displayed from the head of the active editing area. The cursor moves to the head character of the program.

The mode enters the overwrite mode.



(2) Edit the MDI program.



Refer to "4.2.6 Edit Operations" and later.

(Note 1) Before starting MDI operation, confirm that the MDI settings are completed. If "Editing" or "MDI no setting" is displayed, the MDI operation cannot be started.

When the [INPUT] key is pressed, the head block will be searched, and the message "MDI search complete" will appear. The setting will then be completed.

If the cursor is moved without editing, the block indicated by the cursor will be searched for when the [INPUT] key is pressed.

(Note 2) If the [INPUT] key is pressed when the number of MDI program characters including EOB (;) and EOR (%) exceeds 2000, "Memory capacity over" message will appear and the MDI program will not be searched for execution.

Note that the contents edited after the MDI program is saved last will not be saved in the NC memory.

4.2.4 Registering MDI Program in NC Memory

Operation method

(1) Press the menu [MDI regist].



The menu is highlighted and turned to the program No. input wait status.

The cursor appears in the input area.

(2) Set the program No. to be registered and press the [INPUT] key.



MDI program is registered in the memory. The operation message "MDI entry complete" is displayed. The menu highlight returns to normal. The cursor returns to the program display area.

(Note 1) When the [INPUT] key is pressed without entering the program name, a setting error occurs.

(Note 2) When the entered program name already exists in the NC memory, the operation message "Overwrite this file?(Y/N)" is displayed.

(Note 3) MDI programs cannot be registered in the NC memory in the following cases.

- When the setting is made for other than programs with the parameter "#1166 fixpro".
- During "Editing" is displayed.
- When the remaining size of program is smaller than the MDI program to be registered.
- When the remaining number of programs that can be registered is "0".
- Entered program name already exists in the NC memory, and the status is in automatic operation or program restarting.

4.2.5 Deleting a File

Operation method

- (1) Press the menu [Erase file]. → The following menu appears.
The list appears as a pop-up window.
- | | | | | | | | | | |
|--------|----|--|-------------|----|-----|--|-------------|-------------|-------|
| Memory | HD | | Memory card | DS | FLD | | List update | Sort change | Close |
|--------|----|--|-------------|----|-----|--|-------------|-------------|-------|
- (2) Select a device.
(Ex.) Menu [Memory] → The selected device name and directory (memory: /program) appear in the Device name, Directory display column.
For the devices other than memory, root directory is selected.
- (3) Use the \uparrow , \downarrow , \blacktriangleleft , \blacktriangleright keys to align the cursor with target machining program.
The name of the machining program to be deleted can be input in the input area.
- (4) Press the [INPUT] key. → The operation message "Erase? (Y/N)" appears.
- (5) Press the [Y] or [INPUT] key. → The file is deleted.
Press the [N] key not to delete. → The list display is closed.

(Note) The file is not deleted in the following cases.

- The file that is to be deleted is currently being used in automatic operation.
- The file that is to be deleted is subject to edit lock B or C.
- Data protection key 3 is enabled.
- The file to be deleted is in the "program restarting" state.

4.2.6 Editing Operations

When the program is edited, the key input data is directly written into the program display area. All data is overwritten from the cursor position. "Editing" appears on the right side of the file name display once input is started.

Press the [INPUT] key to save the program to the device and clear the "editing" message.

The editing operations from when the file is actually opened are explained in the following sections.
These editing operations are common for the machining program and MDI program.



CAUTION

If "there is no value after the G" command, the operation will be the "G00" operation when the program is run due to key chattering, etc., during editing.

4.2.7 Changing the Display

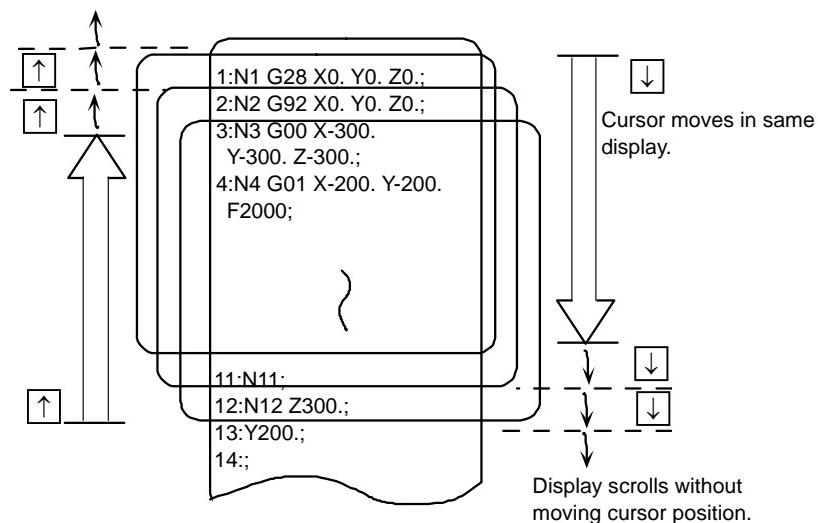
Changing the display with the cursor key

The cursor will move up one line in the program each time the cursor key (\uparrow , \downarrow) is pressed.

If the \downarrow key is pressed at the top line of the program display area, the program will scroll up one line.

If the \uparrow key is pressed at the end, the program will scroll down one line.

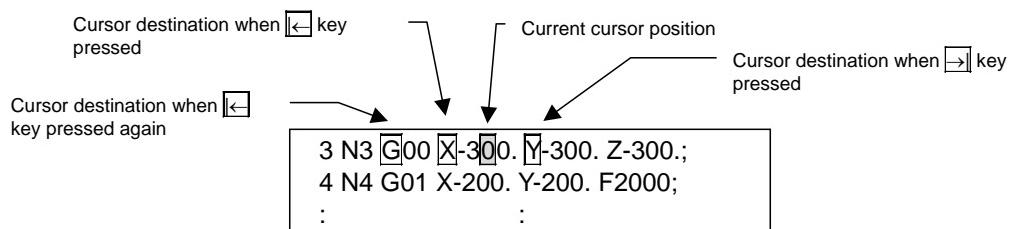
When a block is displayed over 2 or more lines, \uparrow , \downarrow keys move the cursor by block unit during regular editing and by line unit during mass-editing.



Move the cursor using the tab keys (\leftarrow : back tab/ \rightarrow : tab).

\leftarrow key : Moves to the start of the word where the cursor is currently positioned.
If the cursor is at the start of a word, it moves to the start of the previous word.

\rightarrow key : Moves to the word after the word where the cursor is currently positioned.



(Note) Pressing \leftarrow \rightarrow keys or \rightarrow \leftarrow keys does not make any difference in mass-editing.

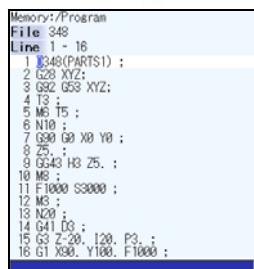
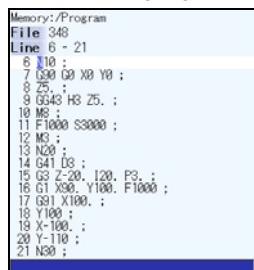
Split display by word unit

In regular editing, program is split by word unit and displayed.

In mass-editing, program is not split by word unit and displayed as text data.

4.2.8 Displaying an Arbitrary Line

Operation method

- (1) Press the menu [Line jump]. → The menu is highlighted.
The cursor appears at the lower input area.
- 
- (2) Input the line No.
(Ex.) 6 INPUT → The program appears with the set line No. at the head.
The cursor moves to the head.
The menu highlight returns to normal.
- 

(Note 1) When "0" is input, the cursor moves to the first line.

(Note 2) When "E" is input, the cursor moves to the end.

4.2.9 Rewriting Data

Operation method

- (1) Move the cursor to the position of the data to be rewritten.

The cursor can be moved to one place to the right of EOB (;).

- (2) Set the data.



The message "Editing" appears when setting is started. The data is set from the position of the cursor. Data at the area is overwritten.

The cursor moves one space (character) at a time to the right as the data is set.

- (3) When one line of setting is completed, press the **[INPUT]** key.



EOB (;) is added to the set data and the data is fixed. When newly creating data, the cursor moves to the head of the next line.

When changing existing data, etc., the cursor does not move.

(Note 1) Up to 255 characters can be input in one block in regular editing and 127 characters in mass-editing.

(Note 2) When the cursor is on or one place to the right of EOB (;), input data is inserted even if not in input mode (refer to "4.2.10 Inserting Data".)

(Note 3) When changing to another function such as the program check, or to another screen such as the operation screen when "Editing" displays, the operation message "Save current file? (Y/N)" displays. If **[N]** key is pressed changing to the other screen once, and the Edit screen is selected again, the program before editing operation will be displayed. (Edited contents will be invalid.)

(Note 4) "Saving" is displayed in flickering during saving.

4.2.10 Inserting Data

Operation method

- (1) Move the cursor to the position where data is to be inserted.
- (2) Press the **INSERT** key. → The insertion mode is entered.
"INS" and "Editing" appear to the right of the file name.
- (3) Set the data. → The data is inserted before the cursor position. Data after the cursor moves to the right.
- (4) When the setting is completed, press the **INPUT** key. → The set data is fixed.
The cursor does not move, but if there is no EOB (;) at the end of the line, it will be added. Then, the cursor moves to the next line.
The mode returns to the overwrite mode, and the message "Editing" disappears.

(Note 1) Up to 256 characters can be set in one line.

(Note 2) The insertion mode will be finished if a key such as **DELETE**, **C.B**, **CAN**, **INPUT**, **↑**, **↓**, **↖**, **↗**, **↖↖**, **↗↗**, **↑↑** or **↓↓** pressed.

(Note 3) During regular editing, EOB (;) is added to the line without EOB (;) before moving to the next line; EOB (;) is not added to the line with EOB (;). (No cursor movement.)

(Note 4) During mass-editing, linefeed is inserted every time EOB (;) is input. (Cursor moves to the head of next line.)

4.2.11 Deleting Data

Operation method (Deleting one character)

(1) Move the cursor to the character to be deleted.

(2) Press the **DELETE** key.



1 character is deleted at the cursor position, and "Editing" appears. The data from the cursor position moves to the left. When this key is held down, the characters can be deleted one at a time.

(3) Press the **INPUT** key.



The edited machining program is saved to the device and "Editing" disappears.

Operation method (Deleting one line)

(1) Move the cursor to the line to be deleted.

(2) Press the **C.B** key.



1 line is deleted at the cursor position, and "Editing" appears. The lines following the cursor position are shifted upward. The cursor position does not change. When this key is held down, the line can be deleted one at a time.

(3) Press the **INPUT** key.



The edited machining program is saved to the device and "Editing" disappears.

(Note 1) In the case where the block for the deleted line covers multiple lines, these lines are also deleted.

(Note 2) Last line only with "%" cannot be deleted.

Operation method (Deleting designated lines)

- (1) Press the **Line clear** menu. → The menu is highlighted.
The cursor appears at the lower input area.
- (2) Designate the deletion range.
(Ex.) From line 8 to line 10
8/10 **INPUT** → The background color for the range to be deleted turns light blue.
The message "Erase? (Y/N)" appears.
- When deleting 1 line, it is also possible to make a selection using the **↑**, **↓** keys and designate by pressing the **INPUT** key.
- Memory:/Program**
File 348
Line 8 - 23
8 Z5. ;
9 G043 H3 Z5. ;
10 M8 ;
11 F1000 S3000 ;
12 M3 ;
- (3) Press the **Y** or **INPUT** key. → The data in the range with the blue background is deleted and the menu highlight returns to normal.
Press the **N** key not to delete. The lines following the deleted data are shifted upward.
The cursor position and top line No. do not change.

- (Note 1)** If the **INPUT** key is pressed without setting a line No., the line where the cursor is will be deleted.
- (Note 2)** If the last line of the file is the range to be deleted, the last line can be designated as "E".
(Example) From 8th line to last line : 8/E
From 1st line to last line: /E
- (Note 3)** Mass-editing has restrictions below.
 - The range has to be within 100 lines.
 - Last line designation switch "/E" is invalid.
- (Note 4)** "Executing" is displayed in flickering during line clear.

Operation method (Deleting several lines (one screen of data) displayed on a screen)

- (1) Press the **CAN** key. → Data (machining program) for 1 screen is deleted, and "Editing" appears.
- (2) Press the **INPUT** key. → The edited machining program is saved to the device and "Editing" disappears.

4.2.12 Searching for Character Strings

Operation method

- (1) Press the **String search** menu. → The menu is highlighted.
The cursor appears at the lower input area.
- (2) Set the character string to be searched for, and press the **INPUT** key.
(Ex.) G20 INPUT → A search for a character string is made from the character after the cursor position downwards.
If the character string is discovered, the cursor moves to the start of that character string.
A message appears if there is no character string applicable to the program.
Marking can be performed by adding an option to the character string being searched for.
((Ex.) G20/MR :G20 are marked in red.
(Refer to the "Marking function" for further details.)
- (3) To continue searching, press the **INPUT** key again. → The next corresponding character string is searched for.
The search finishes when the end of the program is reached.
(Note) It is not possible to return to the head of the program and resume the search. To search from the head of the program, move the cursor to the top line and carry out the search operation again.
- (4) To end the search, press the menu key. → The menu highlight returns to normal, and the character string in the input area disappears.
The search mode is held until the menu key is pressed.
(The character string remains in the input area.)

(Note 1) "Executing" is displayed in flickering during string search.

4.2.13 Replacing Character Strings

A character string in a program can be searched for and replaced.

The following two methods can be used.

- The applicable character string is searched for and replaced one by one. (To search for the next character string, press the **[INPUT]** key.)
- All applicable character strings in the program are replaced in a batch. (Designate "/G" when setting.)

Operation method

- (1) Press the menu **[String replace]**. → The menu is highlighted.
The cursor appears at the lower input area.
- (2) Designate the search character string and the replace character string.
**((Ex.) Search character string: G02
Replace character string: In the
case of G03
G02/G03 [INPUT] (Note 1))** → The character string is searched downward from the character after the current cursor position.
If a character string is discovered, the cursor moves to the start of that character string, and a "Replace? (Y/N)" message appears.
If any character string is not found in the program, the cursor does not move.
- (3) Press the **[Y]** or **[INPUT]** key. → The character string is replaced, and a search is performed for the next applicable character string. (If a batch replacement is performed, a search is not made as the replace has been completed.)
A "Designated character string not found" message appears when the end of the program is reached.
"Editing" appears if replace is performed.
- (4) Press the **[Y]** or **[INPUT]** key again if continuing the search/replace. → The same operation as above is performed.
- (5) To end search/replace, press the **[String replace]**. → The menu highlight returns to normal, and the character string in the input area disappears.
The replacement mode is held until the menu key is pressed.
(The character string remains in the setting area.)

- (Note 1)** When batch replacing for all the character strings in the program, add "/G" to the above setting.
Search character string/replace character string/G **((Ex.) G02/G03/G)**
During batch replacement, after replacing all character strings to the end of the program, the process ends while showing the last character string replaced. Note that the replacement mode is held, and the character string remains in the input area.
- (Note 2)** If the program character strings from the current cursor position to the last line are to be replaced in a batch, add "/E" to the above setting.
Search character string/replace character string/E **((Ex.) G02/G03/E)**
- (Note 3)** "Executing" is displayed in flickering during string replace.

4.2.14 Copying/Pasting Data

Operation method (Copying)

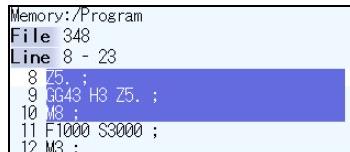
(1) Press the **Line copy** menu.

The menu is highlighted.
The cursor appears at the lower input area.

(2) Designate the range to be copied.
(Ex.) From line 8 to line 10
8/10 **INPUT**

The background color for the range to be copied turns light blue.
The menu highlight returns to normal.

When copying 1 line, it is also possible to make a selection using the **[↑]**, **[↓]** keys and designate by pressing the **INPUT** key.



Notes when copying

- (1) If **INPUT** key is input without setting a line No., the line where the cursor is at is copied.
- (2) The highlight of the copy target lines disappears when editing operations are resumed.
- (3) If the file is edited after the Line copy menu is pressed, the data copied in the line is canceled.
- (4) If the last line of the file is the range to be copied, the last line can be designated as "E".

(Example) From 8th line to last line : 8/E

- (5) The copied data is maintained while the copy source file is opened even if the display type or editing area is switched to another one.
- (6) Up to 100 lines can be copied in mass-editing.

Operation method (Pasting the copied data)

(1) Move the cursor to the line where the data is to be pasted.

The copied data is inserted in the line before the cursor position, and "Editing" appears.

(2) Press the **Line paste** menu.

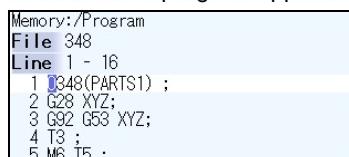
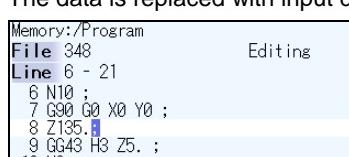
The edited machining program is saved to device, and "Editing" disappears.

- (Note 1)** With multi-program display type, data can be copied and pasted between both left and right areas.
(Note 2) Copy/past is not possible in between regular editing and mass-editing.
(Note 3) "Executing" is displayed in flickering during line paste.

4.2.15 Undoing Program Changes

This is used to return the program to the form when [INPUT] was last pressed to save. This operation is valid for the operation of "Rewriting program", "Insert", "Delete", "Line Paste", "Line Clear", "Character String Replace" and "Undo" functions.

Operation method (Pasting the copied data)

- (1) Change to memory mode and press the main menu [Edit] key. → The searched program appears from the top.

- (2) Move the cursor to the position to be corrected, and input a character.
(Ex.) 135 → The data is replaced with input data and "Editing" appears.

- (3) Press the [INPUT] key. → The edited machining program is saved to the device and "Editing" disappears.
- (4) Press the menu [Undo]. → The contents of the file return to the same condition as when the editing was started in the procedure (1). These contents of the file are saved to the device.
- (5) Press the menu [Undo] again. → The contents of the file return to the same condition as when the file was saved in the procedure (3). These contents of the file are saved to the device.

(Note1) This function is only valid when parameter "#8910 Edit Undo" is set to "1".

(Note2) When returned to the previous status, the cursor will move to the head line.

(Note3) With the multi-program display type, returning to the previous contents is valid only in the active area.

(Note 4) Undoing is not possible in mass-editing mode.

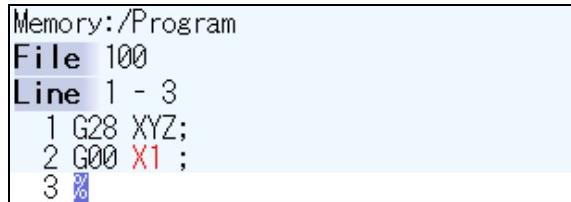
(Note 5) "Executing" is displayed in flickering during undoing.

4.2.16 Correcting/Displaying Input Mistakes

The input mistake check warning function regards the following cases as input mistakes and displays a warning.

Check Item	Warning display range	Details
No decimal point input	Applicable address and data	The decimal point was omitted from the data. (Ex.) N01 G0 X100 Y50.; "X100" displayed as warning

Performing a consecutive input mistake check when creating a program

- (1) Press the menu [Open (New)], input a new file name, and press the **[INPUT]** key. → Only an EOR program is created.
- (2) Press the **[Miss warning]** menu. → The menu is highlighted.
- (3) Edit the program. → A warning is displayed at the moment the **[INPUT]** key is pressed.

- (4) Correct the input mistake and continue with program creation.

Performing a batch input mistake check for an existing program

(1) Change the operation to memory mode or MDI mode and perform a machining program operation search.

(2) Press the **Edit** menu.



Machining programs appear from the top.

(3) Press the **Miss warning** menu.



A warning displays the position where an input mistake occurred. The cursor moves from its current position to the first input mistake that was found.

```
Memory:/Program
File 348          Editing
Line 11 - 26
11 F1000 S3000 ;
12 M3 ;
13 N20 ;
14 G41 D3 ;
15 G3 Z-20. I20. P3. ;
16 G1 X90. Y100. F1000 ;
17 G91 X100. ;
18 Y100 ;
19 X-100 ;
20 Y-110 ;
21 N30 ;
22 G90 G0 Z5. ;
23 G40 ;
24 G91 G28 Z0 ;
25 M2 ;
```

(4) Press the **Next miss** menu.



The cursor moves to the next input mistake position.

```
Memory:/Program
File 348          Editing
Line 11 - 26
11 F1000 S3000 ;
12 M3 ;
13 N20 ;
14 G41 D3 ;
15 G3 Z-20. I20. P3. ;
16 G1 X90. Y100. F1000 ;
17 G91 X100. ;
18 Y100 ;
19 X-100 ;
20 Y-110 ;
21 N30 ;
22 G90 G0 Z5. ;
23 G40 ;
24 G91 G28 Z0 ;
25 M2 ;
```

(5) Correct the input mistake and continue with program creation.

4.3 Program Check (2D)

The program check function (2D) is used to graphically draw the machining program movement path without performing auto operation.

The machining program can be checked with graphic data drawn at a high speed.

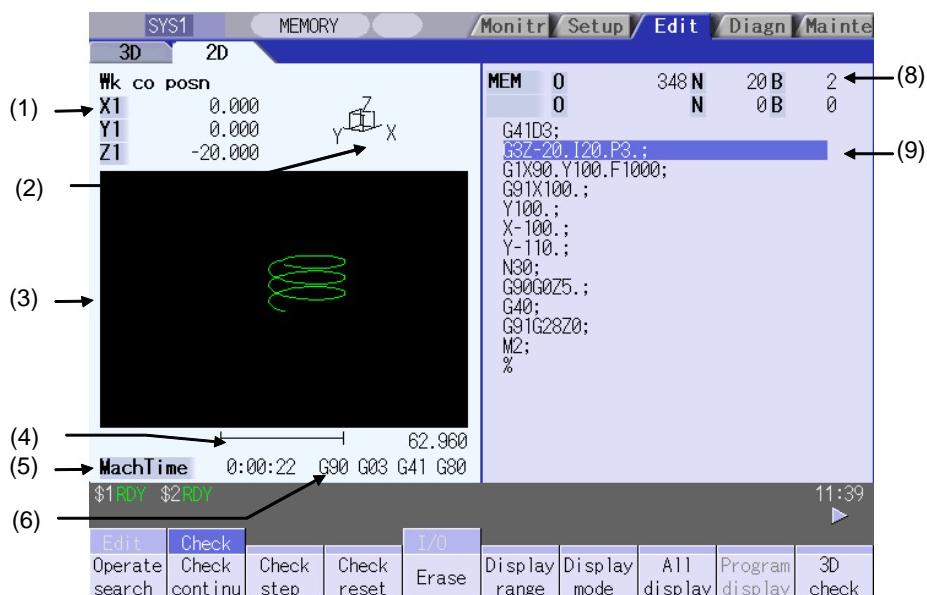
Using **All display** menu, normal display and full-screen display modes can be switched.

(Note1) The program check (2D) function is an additional specification. The graphic check option is required.

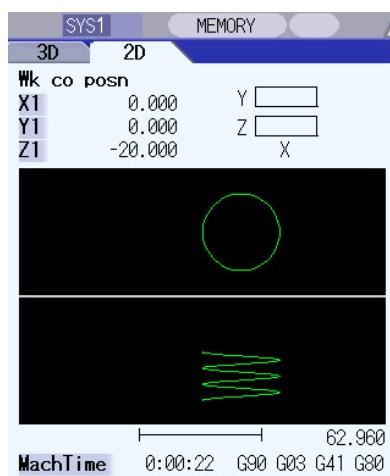
(Note2) When changing the screen to the edit screen, display depends on the previous checking type (2D/3D). Note that when selecting this screen during graphic trace, 3D solid program check will apply. If the 3D solid check option is not valid in this time, the area of "Check" tag will not be blank.

■ Normal display (full-screen display mode is OFF)

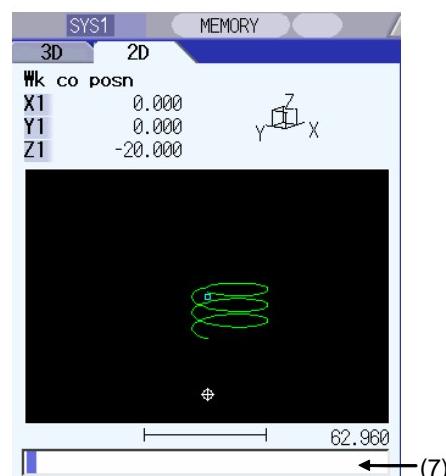
< Drawing area >



< Drawing area: 2-plane >



< Input area displayed >



4. Edit Screens

4.3 Program Check (2D)

- Full-screen display (full-screen display mode is ON)

< Drawing area >



Display items

Display item	Details
(1) Check counter	<p>This displays the axis counter for the check drawing. The displayed counter type and axis name (3 axes) are set in the parameters.</p> <p>[Counter] #1231 set03 (bit5) 0: Machine position counter, 1: Workpiece coordinate position counter</p> <p>[Axis name] #1026 to #1028 base_I, base_J, base_K</p> <p>(Note) When the setting values of #1026 to #1028 have been changed, the changed values will be reflected in the check counter display when the power is turned ON again.</p>
(2) Display mode	This shows the plane for drawing.
(3) 2D drawing area	<p>This is the area where the tool path is drawn when performing a program check. The drawing viewpoint can be moved, and the drawing size can be enlarged and reduced.</p> <p>Select the zero point to be displayed with following parameter:</p> <p>#1231 set03/bit4 0:Basic machine coordinate system zero point 1:Workpiece coordinate system zero point</p>
(4) Scale	This shows the display range scale. Use Zoom in or Zoom out menu to change the scale value.
(5) Machining time display	This calculates and displays the machining time.
(6) G modal display for check	<p>This displays the following modals.</p> <ul style="list-style-type: none"> • Absolute/incremental (G90, G91: Group 3) • Operation mode (G00, G01, G02, G03 etc.: Group 1) • Tool radius compensation (G40, G41, G42: Group 7) • Fixed cycle (G80, G81 etc.: Group 9)
(7) Input area	<p>This displays details of the key input when setting the scale value and display axis name.</p> <p>Press the menu Display range, Display mode keys to display the input area.</p>

4. Edit Screens

4.3 Program Check (2D)

Display item	Details
(8) Currently executed machining program	
Main O10...	This displays the device name, program number, sequence number, and block number currently being executed.
Sub O1234...	This displays the sub-program device name, program number, sequence number, and block number for the sub-program currently being accessed.
(9) Buffer display	This displays the contents of the machining program currently being checked. The block being executed is highlighted.

Menus

Menu	Details	Type	Reference
Operate search	This performs an operation search and a check search. Select a program to perform a check from the program file list displayed in the pop-up window.	C	4.3.1 Checking Continuously
Check continu	This checks the program continuously.	B	
Check step	This checks the program per block.	B	4.3.2 Checking One Block at a Time
Check reset	This resets the program check.	C	4.3.3 Cancelling the Program Check
Erase	This erases the graphics displayed on the screen. Each time this menu is pressed, the graphic data is erased in the order of rapid traverse and cutting feed.	C	
Display range	This changes the graphic drawing display range. Press this menu to display the menu for changing the display mode. This changes the display range and erases the graphic data displayed on the screen.	C	4.3.5 Changing the Display Range
Display mode	This changes the drawing plane. Press this menu to display the menu for changing the display mode. There are 3 types of graphic drawing display mode: 1-plane, 2-plane, and 3-dimension. This changes the drawing plane and erases the graphic data displayed on the screen.	C	4.3.6 Changing the Display Mode
All display	This switches the normal display mode and the full-screen display mode.	B	4.3.8 Switching to Full-screen Display Mode
Program display	This displays the machining program being checked on the graphic drawing area. This menu can be selected only when the full-screen display mode is applied.	B	
3D check	This changes the program check (3D) display. (This menu does not display if the 3D solid graphic check option is disabled.) This menu cannot be selected while the check is performed or interrupted.	C	4.4 Program Check (3D)
Rotate	This sets the viewpoint angle for the 3-dimension display mode. This changes the viewpoint angle and erases the graphic data displayed on the screen. However, this menu cannot be used for other than the 3-dimension display mode.	C	4.3.7 Changing the Display Angle
Std range	The display range (scale and display position) is automatically set from the machine movable area. The machine movable area is set with the parameters "#2013 OT-" and "2014 OT+" (software limit). When the display range is changed, the graphic data displayed on the screen is erased.	C	

(Note) The menu **3D check** and **Operate search** keys cannot be selected while the check is performed or interrupted. Menu can be selected after **Check reset** is pressed.

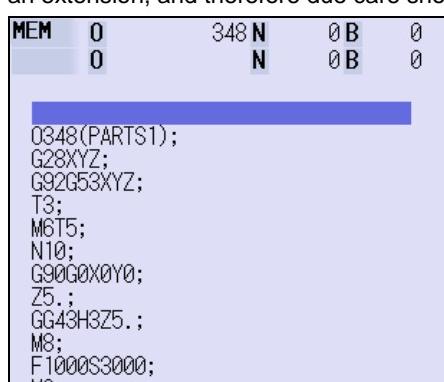
4.3.1 Checking Continuously

Operation method

- (1) Press the main menu **Check**. → The program check screen becomes active.
Press the menu **2D Check** when the program check (3D) appears.
 - (2) Press the **Operate search** key. → The following menu appears.
The list appears in a pop-up window.

 - (3) Select a device.
(Ex.) Menu Memory → The selected device name and directory (memory: /program) appear in the device name and directory display columns.
 - (4) Use the **↑**, **↓**, **↑**, **↓** keys to align the cursor with the target machining program.
The name of the machining program to be edited can be input in the input area.
- (Note)** When the number of characters of directory path (full path) exceeds 48, changing directories cannot be performed.
- (5) Press the **INPUT** key. → The check search is started.
When setting data exists in the input area, a search is performed in this data. This procedure is also used when performing an NB search.
(Ex.)

1001/1/2	O1001 N1 B2
1001.PRG/1/2	O1001.PRG N1 B2
/1/2	(current O number) N1 B2
1001//2	O1001 N0 B2
1001/1	O1001 N1 B0
1001	O1001 N0 B0
/1	(current O number) N1 B0
//2	(current O number) N0 B2

The system distinguishes between the presence or lack of an extension, and therefore due care should be taken.


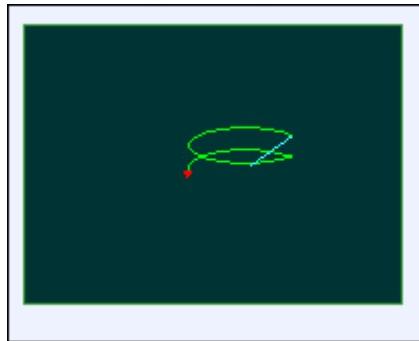
- (6) Press the **Check continu** key.

A block stoppage occurs when performing a program check if the **Check continu** or **Check step** keys are pressed while performing a continuous check. Furthermore, the program check is restarted if the **Check continu** key is pressed during the block stoppage.

The program check is reset if the **Check reset** key is pressed while performing a continuous check.

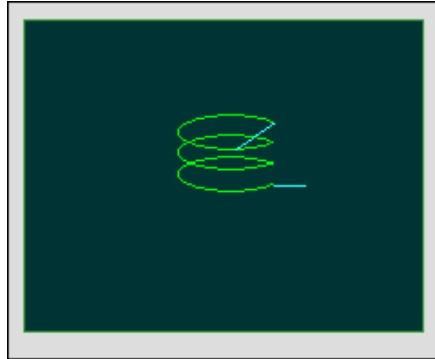


A program check is executed and that path is drawn. A "Checking" message appears and the menu is highlighted. The check counter display is updated. The check G modal does not display. The machining time is updated.



A "Program check completed" message appears when the continuous check is completed.

The **Check continu** menu highlight returns to normal.



4.3.2 Checking One Block at a Time

Operation method

- (1)

Press the main menu [Check].

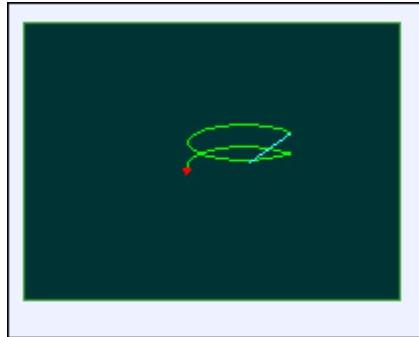
 → The program check screen becomes active.
Press the menu [2D check] key when the program check (3D) appears.
- (2)

A check search is performed using the same method as for "4.3.1 Checking Continuously".
- (3)

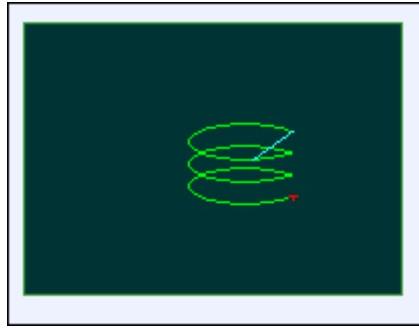
Press the menu [Check step].

 → The program check is executed for one block, and a graphic drawing of the machining program movement path is made. The check counter display is updated. The check G modal display is updated.

<State during one block check>



<State when one block check is completed>

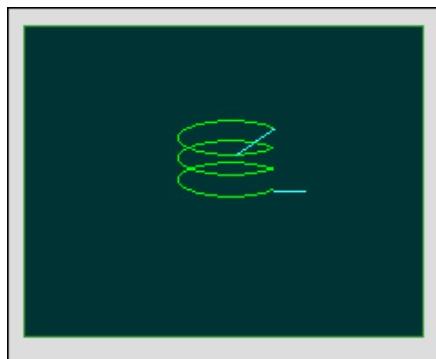


(4) Press the menu [Check step].

The program check is continued from the next block if the [Check continu] key is pressed during block stoppage.



The program check is executed for the next block. The menu returns to normal state.



4.3.3 Canceling the Program Check

Operation method

(1) Press the menu [Check reset].



The program check is reset and a "Reset complete" message appears.

4.3.4 Changing the Display Range

The graphic drawing's scale can be enlarged or reduced, and the position moved or centered.

Operation method (Enlarging the and reducing the drawing)

(1) Press the menu [Display range].



A white frame indicating the display range appears on the screen.

The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Center-ing			
---------	----------	----	------	------	-------	------------	--	--	--

(2) Press the menu [Zoom In] or [Zoom out].



The size of the white frame can be changed by using key operations.

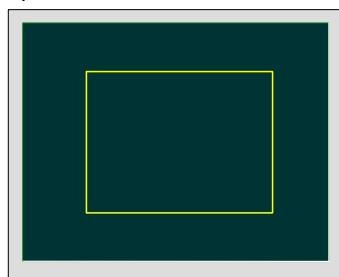
To enlarge the drawing size:

Press the menu [Zoom In] or [-] key.

To reduce the drawing size:

Press the menu [Zoom out] or [+] key.

A solid-line frame appears with respect to the original scale when enlarging, and a dotted-line frame appears when reducing.



(3) Press the [INPUT] key.



The display scale changes.

By changing the display scale, the graphic data displayed on the screen is erased.

It is also possible to change the display scale by setting a scale value in the input area.

Operation method (Changing the drawing display position)

(1) Press the menu [Display range].



A white frame indicating the display range appears on the screen.

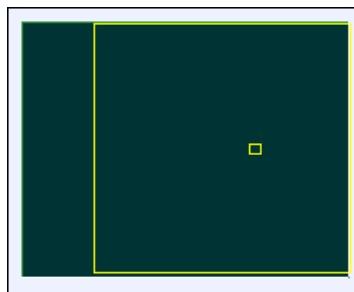
The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Centering			
---------	----------	----	------	------	-------	-----------	--	--	--

(2) Press the [Up], [Down], [Left], [Right] menu or cursor movement keys \uparrow , \downarrow , \leftarrow , \rightarrow .



The cursor (□) indicating the center of the display and the frame line move up, down, left and right according to the key operations.



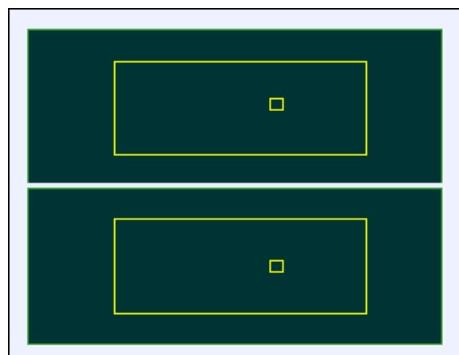
(3) Press the [INPUT] key.



The display position changes so that the cursor position (□) is the center of the area.

By changing the display position, the graphic data displayed on the screen is erased, however, the scale value is not changed.

(Note 1) When changing the display range while the 2-plane display mode such as "XY/XZ", the display range (scale and display position) for the upper and lower areas changes in the same manner. The operation method is the same as the 1-plane display mode.



The white-framed display range in the upper and lower areas simultaneously move to the left/right when the [Left], [Right] keys are pressed.

The white-framed display range of either upper or lower areas moves up and down when the [Up], [Down] keys are pressed.

Which frame to be moved up/down can be changed with the page key.

(Note 2) The set displayed position will be held even after the power is turned OFF and ON again.

Operation method (Centering)

(1) Press the menu [Display range]. → A white frame indicating the display range appears on the screen.

The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Centering			
---------	----------	----	------	------	-------	-----------	--	--	--

(2) Press the [Centering]. → The display position is changed so that the current machine position appears in the center of the drawing area.

(Note 1) In the 2-plane display mode such as "XY/XZ", centering is applied for the upper and lower areas.
The operation method is the same as the 1-plane display mode.

(Note 2) When the [Centering] menu key is pressed after the display scale has changed, only the centering is applied without changing the scale value.

4.3.5 Changing the Display Mode

There are three types of graphic drawing mode: 1-plane, 2-plane, and 3-dimension. Press the menu **Display mode** key, and by selecting one of the following display mode menus, the axis configuration for each plane changes, and the menu display returns to normal. It is also possible to change the display mode by setting the axis name in the input area.

(Note 1) When the display mode is changed, the graphics displayed up to that point are erased.

(Note 2) These set display mode is maintained even after rebooting the machine.

(Note 3) The display mode can be set independently at the trace function and program check function.
These settings are not linked with one another.

(Note 4) The menu axis names XYZ are compatible with the basic axes IJK. X = base axis I, Y = base axis J, and Z = base axis K.

Display mode menu

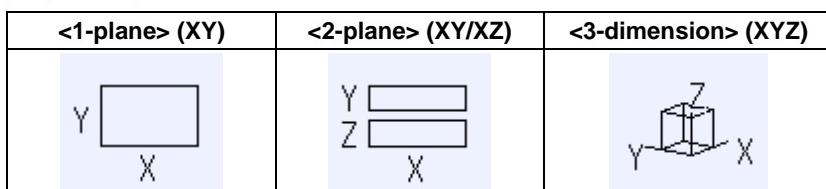
Menu	Details	Type
XY	This changes to the 1-plane display mode configured of X-Y. The X-axis display in the horizontal axis, and the Y-axis displays in the vertical axis.	C
YZ	This changes to the 1-plane display mode configured of Y-Z. The Y-axis display in the horizontal axis, and the Z-axis displays in the vertical axis.	C
XZ	This changes to the 1-plane display mode configured of X-Z. The X-axis display in the horizontal axis, and the Z-axis displays in the vertical axis.	C
XY/XZ	Changes to 2-plane display mode composing X-Y, and X-Z. The X-axis display in the horizontal axis, and the Y-axis and Z-axis display in the vertical axis.	C
YX/YZ	Changes to 2-plane display mode composing Y-X, and Y-Z. The Y-axis display in the horizontal axis, and the X-axis and Z-axis display in the vertical axis.	C
XYZ	This changes to the three-dimensional display mode. A cube is displayed on the lower right of the screen.	C

Changing the display axis name

- (1) Set the axis name and press the **INPUT** key. → XYZ appears the graphic display mode name.
There are 3 drawing axes: X, Y, and C.
- XYC **INPUT**

There are three types of display mode: 1-plane, 2-plane, and 3D. An image displays which display mode is currently selected. The selected axis name displays for the image axis name.

Display example



4.3.6 Changing the Display Angle

This is used to set the graphic drawing display angle when in 3-dimension display mode. Press the menu key or cursor keys to rotate the cubic displayed at the screen upper right and press the **INPUT** to set.

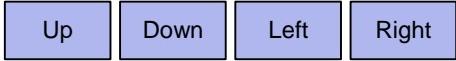
(Note 1) When the display angle is changed, the graphics displayed up to that point are erased.

(Note 2) The set display angle is maintained even after rebooting the machine.

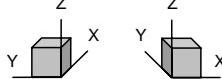
(Note 3) The display angle can be set independently at the trace function and program check function.

These settings are not linked with one another.

Operation method

- (1) **Press the menu [Rotate].** → The mode changes to the rotation mode and the following menu appears.

- (2) **Use the [Up], [Down], [Left], [Right] menu to adjust the display angle.** → Rotate the cubic display in the lower right of the screen using the operation keys.

The cursor movement keys (\uparrow , \downarrow , \leftarrow , \rightarrow) can also be used to rotate.


- (3) **Press the [INPUT] key.** → The display angle changes. By changing the display angle, the graphic data displayed on the screen is erased.

(Note 1) The set display angle is maintained even after rebooting the machine.

4.4 Program Check (3D)

Program check (3D) is a function that draws the workpiece shape and tool movement in the cutting process of the machining program as a solid image without executing automatic operation. The machining program can be checked with graphic data drawn at a high speed.

This function requires workpiece and tool shape settings.

Using **All display** menu, normal display and full-screen display modes can be switched.

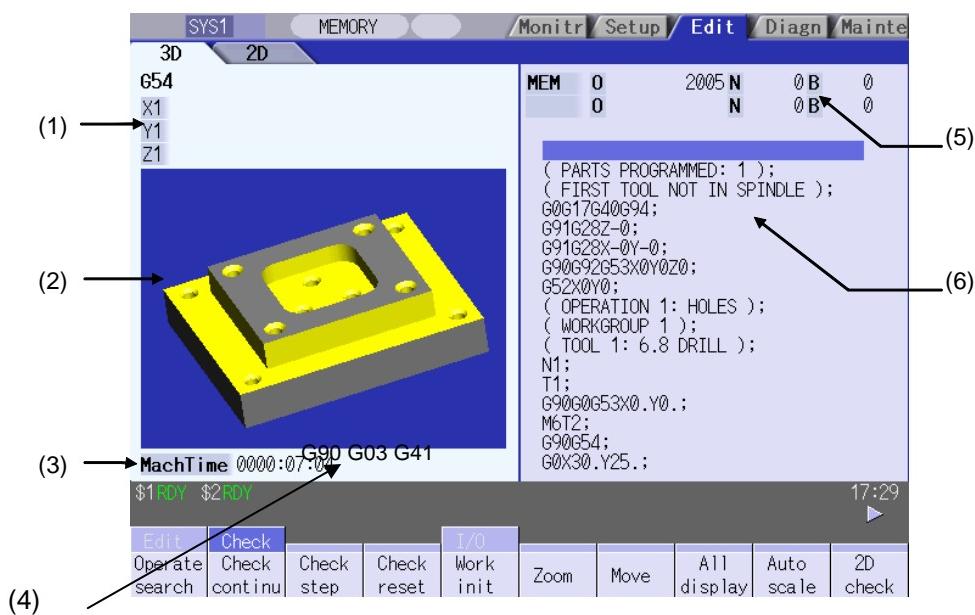
(Note 1) The program check (3D) function is an additional specification. The graphic check and 3D solid graphic check option is required.

(Note 2) When changing the screen to the edit screen, display depends on the previous checking type (2D/3D). Note that when selecting this screen during graphic trace, 3D solid program check will apply.

If the 3D solid check option is not valid in this time, the area of Check tag will not be blank.

■ Normal display (full-screen display mode is OFF)

<Drawing area>



Display items

Display item	Details
(1) Check counter	<p>This displays the axis counter for check drawing. The displayed counter type and axis names (3 axes) are set in the parameters.</p> <p>[Counter] #1231 set03(bit5) 0: Machine position counter, 1: Workpiece coordinate position counter</p> <p>[Axis name] #1026 - #1028 base_I, base_J, base_K</p> <p>(Note) When the setting values of #1026 to #1028 have been changed, the changed values will be reflected in the check counter display when the power is turned ON again.</p>
(2) 3D drawing area	<p>This area is used to display a solid graphic drawing of the workpiece shape and tool movement during the cutting process in the machining program.</p> <p>The drawing viewpoint can be moved, and the drawing size can be enlarged and reduced.</p>

4. Edit Screens

4.4 Program Check (3D)

Display item	Details
(3) Machining time display	This calculates and displays the time taken for machining.
(4) Check G modal display	This displays the following modals: <ul style="list-style-type: none">• Absolute/incremental (G90, G91: Group 3)• Operation mode (G00, G01, G02, G03 etc.: Group 1)• Tool radius compensation (G40, G41, G42: Group 7)• Fixed cycle (G80, G81 etc.: Group 9)
(5) Currently executed machining program	
Main O10...	This displays the device name, program No., sequence No., and block No. currently being executed.
Sub O1234...	When sub-program is being executed, the sub-program device name, program No., sequence No., and block No. are displayed.
(6) Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted.

Menus

Menu	Details	Type	Reference
Operate search	This performs an operation search and a check search. Select a program to be checked from the program file list displayed in the pop-up window.	C	4.4.1 Checking Continuously
Check continu	This checks a program continuously.		
Check step	This checks a program per block.	B	4.4.2 Checking One Block at a Time
Check reset	This resets a program check.	C	4.4.3 Canceling the Program Check
Work init	This initializes the workpiece shape. Displays the pre-machining workpiece shape set at the "Work set" window (workpiece shape setting). At this time, the cross-section status is cancelled.	C	
Zoom	This enlarges/reduces the displayed workpiece shape.	C	4.4.4 Enlarging and Reducing the Workpiece Shape
Move	This moves the displayed workpiece shape.	C	4.4.5 Moving the Workpiece Shape
All display	This switches the normal display mode and the full-screen display mode.	C	
Rotate	This rotates the displayed workpiece shape.	C	4.4.6 Rotating the Workpiece Shape
Auto scale	The scale is automatically set so that the pre-machining workpiece shape set at the "Work set" window (workpiece shape setting) takes up approximately 90% of the drawing area.	C	
2D check	This changes the program check (2D) display. This menu cannot be selected while the check is performed or interrupted.	C	4.3 Program Check (2D)
Colli check	This enables or disables the interference check. When the interference check is enabled, if the tool and workpiece contact each other when performing rapid traverse (G0) movement, the contact location is drawn in a color highlighting the interference.	B	4.4.7 Performing an Interference Check
Work setting	This sets the workpiece shape used at the solid display.	C	4.4.9 Setting the Workpiece Shape
Tool setting	This sets the tool shape used at the solid display.	C	4.4.10 Setting the Tool Shape

(Note 1) When the graphic trace mode is entered and automatic operation is running, the menu **Operate search**, **Check continu**, **Check step**, **Check reset** cannot be selected and the 3D solid program check cannot be performed.

Only the 3D solid program check can be performed unless the automatic operation is running.

(Note 2) The menu **2D check**, **Operate search**, **Work setting**, **Tool setting** cannot be selected while the check is performed or interrupted.

4.4.1 Checking Continuously

Operation method

- (1) Press the main menu [Check]. → The program check screen becomes active.
Press the menu [3D Check] key when the program check (2D) appears.
- (2) Press the [Operate search] key. → The following menu appears.
The list appears in a pop-up window.
- | | | | | | | | | | |
|--------|----|--|-------------|----|-----|-------------|-------------|--|-------|
| Memory | HD | | Memory card | DS | FLD | List update | Sort change | | Close |
|--------|----|--|-------------|----|-----|-------------|-------------|--|-------|
- (3) Select a device.
(Ex.) Menu [Memory] → The selected device name and directory (memory: /program) appear in the device name and directory display columns.
- (4) Use the \uparrow , \downarrow , \leftarrow , \rightarrow keys to align the cursor with the target machining program.
The name of the machining program to be edited can be input in the input area.
- (Note)** When the number of characters of directory path (full path) exceeds 48, changing directories cannot be performed.
- (5) Press the [INPUT] key. → The check search is started.
A "Search completed" message appears when the search is completed.
After performing the search, the function and program position appear in the current machining program display column.
The list is then closed.
The system distinguishes between the presence or lack of an extension, and therefore due care should be taken.
- (Ex.)**
- ```

1001/1/2 O1001 N1 B2
1001.PRG/1/2 O1001 N1 B2
/1/2 (current O number) N1 B2
1001//2 O1001 N0 B2
1001/1 O1001 N1 B0
1001 O1001 N0 B0
/1 (current O number) N1 B0
//2 (current O number) N0 B2

```
- |     |   |     |   |   |   |   |
|-----|---|-----|---|---|---|---|
| MEM | 0 | 348 | N | 0 | B | 0 |
|     | 0 |     | N | 0 | B | 0 |
- ```

0348(PARTS1);
G28XYZ;
G92G53XYZ;
T3;
M6T5;
N10;
G90G0X0Y0;
Z5. ;
GG43H3Z5. ;
M8;
F1000S3000;
M3;

```

- (6) Press the **Check continu** key.

A block stoppage occurs when performing a program check if the **Check continu** or **Check step** keys are pressed while performing a continuous check. Furthermore, the program check is restarted if the **Check continu** key is pressed during the block stoppage.

The program check is reset if the **Check reset** key is pressed while performing a continuous check.



A program check is performed, and a solid drawing is made for the cutting process workpiece shape and tool movement. A "Checking" message appears and the **Check continu** menu is highlighted.

The check counter display is updated. The check G modal does not appear. The machining time is updated.

A "Program check completed" message appears when the continuous check is completed. The **Check continu** menu highlight returns to normal.

4.4.2 Checking One Block at a Time

Operation method

- (1) Press the main menu **Check**.

Press the menu **3D check** key when the program check (2D) appears.



The program check screen becomes active.

- (2) A check search is performed using the same method as for "4.4.1 Checking Continuously".

- (3) Press the menu **Check step**.



The program check is executed for one block, and a solid drawing of the workpiece shape and tool movement during the cutting process is made.

The check counter display is updated. The check G modal display is updated. The machining time is updated.

- (4) Press the menu **Check step**.



The program check is executed for the next block.

The program check is continued from the next block if the **Check continu** key is pressed during block stoppage.

4.4.3 Canceling the Program Check

Operation method

- (1) Press the menu **Check reset**.



The program check is reset and a "Reset complete" message appears.

4.4.4 Enlarging and Reducing the Workpiece Shape

Operation method

(1) Press the menu [Zoom].



The mode changes to the enlargement/reduction mode, and the following menu appears.



(2) Press the menu [Zoom in].



To enlarge the drawing:

Press the menu [Zoom in] or [-] key.

To reduce the drawing size:

Press the menu [Zoom out] or [+key].

4.4.5 Moving the Workpiece Shape

Operation method

(1) Press the menu [Move].



The mode changes to the movement mode and the following menu appears.



(2) Use the [Up], [Down], [Left], [Right] keys to adjust the display position.



The workpiece shape moved in the designated direction is redisplayed.

The cursor movement keys (\uparrow , \downarrow , \leftarrow , \rightarrow) can also be used for moving.

4.4.6 Rotating the Workpiece Shape

Operation method

(1) Press the menu [Rotate].



The mode changes to rotation mode and the following menu appears.



(2) Use the [Up], [Down], [Left], [Right] keys to adjust the display angle.



The workpiece shape rotated in the designated direction is redisplayed.

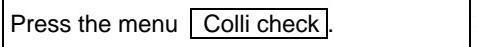
The cursor movement keys (\uparrow , \downarrow , \leftarrow , \rightarrow) can also be used to rotate.

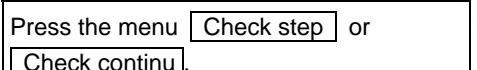
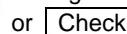
(Note 1) The set display angle is maintained even after rebooting the machine.

4.4.7 Performing an Interference Check

If the tool and workpiece contact when performing rapid traverse (G0) movement, the contact location is drawn in a color highlighting the interference.

Operation method

- (1)  → The menu is highlighted.

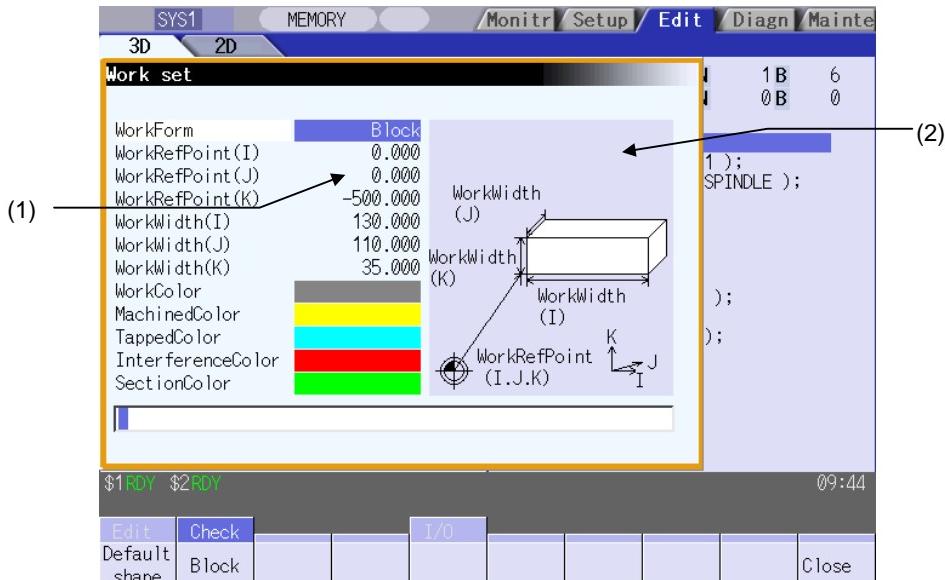
- (2)  → A program check is performed, and a solid drawing of the workpiece shape and tool movement during the cutting process is performed.
A "Checking" message is displayed and the menu  or  key is highlighted.
The workpiece and tool contact, this is drawn in a color highlighting the interference.

4. Edit Screens

4.4 Program Check (3D)

4.4.8 Setting the Workpiece Shape

Press the menu **Work setting** key to display a pop-up window similar to the following, and set the workpiece shape used in the solid display.



Display items

Display item	Details
(1) Workpiece shape setting area	This sets all workpiece shape items.
(2) Guide drawing	This displays a material shape guide drawing.

Menus (the cursor is at WorlForm (material shape))

Menu	Details	Type	Reference
Default shape	This sets the material shape. The drawings are made as a block when the default shape is selected.	C	"Setting the material shape"
Block			
Close	This closes the pop-up window and quits this function.	C	

Menus (the cursor is at WorkRefPoint(I,J,K) (material basic point), or WorkWidth (material width))

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

Menus (the cursor is at the WorkColor, MachinedColor, TappedColor, InterferenceColor, SectionColor in the window)

Menu	Details	Type	Reference
Default color	This sets the material color (WorkColor), machining surface color (MachinedColor), tap surface color (TappedColor), interference surface color (InterferenceColor), and cross section color (SectionColor).	C	"Setting the material color"
Gray	The drawings are made using the following colors when the default colors are selected. Material color : Gray Machining surface color : Yellow Tap machining surface color : Light blue Interference surface color : Red Cross section color : Green		
Red			
Yellow			
Blue			
Green			
Light blue			
Purple			
Pink			
Close	This closes the pop-up window and quits this function.	C	

Setting the material shape (WorkForm)

(1) Use the   keys to move the cursor to the material shape settings column.

(2) Press the menu .

It is also possible to set input values.

0  : Default shape

1  : Block



"Block" appears at the cursor position.

The cursor moves one place down.

A block guide drawing appears in the guide drawing area.

Setting the material basic point (WokRefPoint (I)) and size (WrkWidth (I,J,K))

Enter the material basic point and size. Specify the material basic point with the machine coordinate.

- (1) Use the , keys to move the cursor to the material basic point (I) setting column.

- (2) Input data.

(Ex.) 100

"100.000" appears at the cursor position.
The cursor moves one place down.

- (3) Other basic points and width data are set in the same way.

(Note 1) The workpiece will not be displayed if two or more size data are "0".

(Note 2) The setting range of the material basic point and width is as follows.

#1003 iunit	#1041 I_inch	
	0 (mm)	1 (inch)
B	-99999.999 to 99999.999	-9999.9999 to 9999.9999
C	-99999.9999 to 99999.9999	-9999.99999 to 9999.99999
D	-99999.99999 to 99999.99999	-9999.999999 to 9999.999999
E	-99999.999999 to 99999.999999	-9999.9999999 to 9999.9999999

Setting the material color (WorkColor)

- (1) Use the , keys to move the cursor to the material color setting column.

- (2) Press the material color menu.

(Ex.) Menu

The cell where the cursor is located appears in gray.
The cursor moves one place down. (The cursor does not move when at the cross section color.)

It is also possible to set input values.

- 0 : Default color
- 1 : Gray
- 2 : Red
- 3 : Yellow
- 4 : Blue
- 5 : Green
- 6 : Light blue
- 7 : Purple
- 8 : Pink

- (3) Other color data is set in the same way.

(Note) The following colors are used if the default colors are designated.

- Material color : Gray
- Machining surface color : Yellow
- Tap machining surface color : Light blue
- Interference surface color : Red
- Cross section color : Green

4. Edit Screens

4.4 Program Check (3D)

4.4.9 Setting the Tool Shape

Press the menu [Tool setting] key to display a pop-up window similar to the following, and set the tool shape used in the solid display.



Display items

Display item	Details
(1) Tool shape setting area	This sets all tool shape items.
(2) Guide drawing	This displays a tool shape guide drawing.
(3) Tool clear guidance area	This displays a guidance concerning the area of tool clear.

Menus (when the cursor is at the tool number)

Menu	Details	Type	Reference
Tool clear	<p>This clears the tool shape data where the cursor is located. Specification method: Tool No. to start/end tool clear (Example) 10/30: Data in the lines of tool No.10 to 30 will be cleared. 10/E: Data in the lines of tool No.10 and after will be cleared. When the [INPUT] key is pressed without specifying tool No., the data in the line at the current cursor position will be cleared.</p>	A	"Clearing the tool number"
Close	This closes the pop-up window and quits this function.	C	

4. Edit Screens

4.4 Program Check (3D)

Menus (when the cursor is at Kind (tool type))

Menu	Details	Type	Reference
Default tool	This sets the tool type. A drill displays if the default tool is selected.	C	"Setting the tool type"
Ball endmill			
Flat endmill			
Drill			
Bulnose endmill			
Chamfer			
Tap			
Close	This closes the pop-up window and quits this function.	C	

Menus (when the cursor is at Radius (tool radius), Length (tool length), or ToolData1,2 (shape data))

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

Menus (when the cursor is at CL (tool color))

Menu	Details	Type	Reference
Default color	This sets the tool color. This displays in red if the default color is selected.	C	"Setting the tool color"
Gray			
Red			
Yellow			
Blue			
Green			
Light blue			
Purple			
Pink			
Close	This closes the pop-up window and quits this function.	C	

Registering the tool data

A maximum of 80 tools can be registered.

- (1) Use the cursor keys to move the cursor to the tool number setting column.

The cursor can be moved freely from the 1st to the 80th line regardless of the number of tools being registered.

- (2) Input the Tool No.
(Ex.) 10 INPUT

"10" appears at the cursor position.
The cursor moves one place to the right.

(Note 1) Register a new tool data to set the default value for the tool type, tool radius, tool length, and shape data 1,2, and tool color.

(Note 2) If two or more of the same tool number is registered, the tool shape data that is registered first is selected.

(Note 3) When an unregistered tool is selected, the previously used tool is used as is.

Clearing the tool data (Clearing tool data for one line at the cursor position)

<When inputting directly>

- (1) Use the cursor keys to move the cursor to the tool number setting column.

- (2) Input as shown below.
0 INPUT

The contents of the line where the cursor is located are all cleared.
The cursor does not move.

<When using menu operations>

- (1) Use the cursor keys to move the cursor to the tool number setting column.

- (2) Press the menu [Tool clear].

The menu is highlighted.

- (3) Press the INPUT key.

Background color of the line at the cursor position is turned to light blue.
The operation message "Erase?(Y/N)" is displayed.

- (4) Press the Y or INPUT key.

Press any key other than Y and INPUT to cancel.

The contents of the line where the cursor is located are all cleared.
Background color of the line at the cursor position is returned.
The cursor does not move.
The menu highlight is returned to normal.

Setting the tool type (Kind)

(1) Use the cursor keys to move the cursor to the tool type setting column.

(2) Press the tool type menu.

(Ex.) Menu Ball endmill

It is also possible to set input values.

0 INPUT : Default tool

1 INPUT : Ball end mill

2 INPUT : Flat end mill

3 INPUT : Drill

4 INPUT : Bull nose end mill

5 INPUT : Chamfer

6 INPUT : Tap



"Ball endmill" appears at the cursor position.

The cursor moves one place to the right.

The ball end mill guide drawing (note) appears in the guide drawing area.

(Note) The drill appears in the guide drawing area when the default tool is designated.

Tool type guide drawing

1: Ball end mill	2: Flat end mill	3: Drill
4: Bull nose end mill	5: Chamfer	6: Tap

Setting the tool color (CL)

Set the tool color for each tool.

(1) Use the cursor keys to move the cursor to the tool color setting column.

(2) Press the tool color menu.
(Ex.) Menu Green



The cell where the cursor is located appears in green.
The cursor moves to the tool number column one line below.

It is also possible to set input values.

- | | | |
|---|-------|-----------------|
| 0 | INPUT | : Default color |
| 1 | INPUT | : Gray |
| 2 | INPUT | : Red |
| 3 | INPUT | : Yellow |
| 4 | INPUT | : Blue |
| 5 | INPUT | : Green |
| 6 | INPUT | : Light blue |
| 7 | INPUT | : Purple |
| 8 | INPUT | : Pink |

(Note) The tool appears in red when the default color is designated.

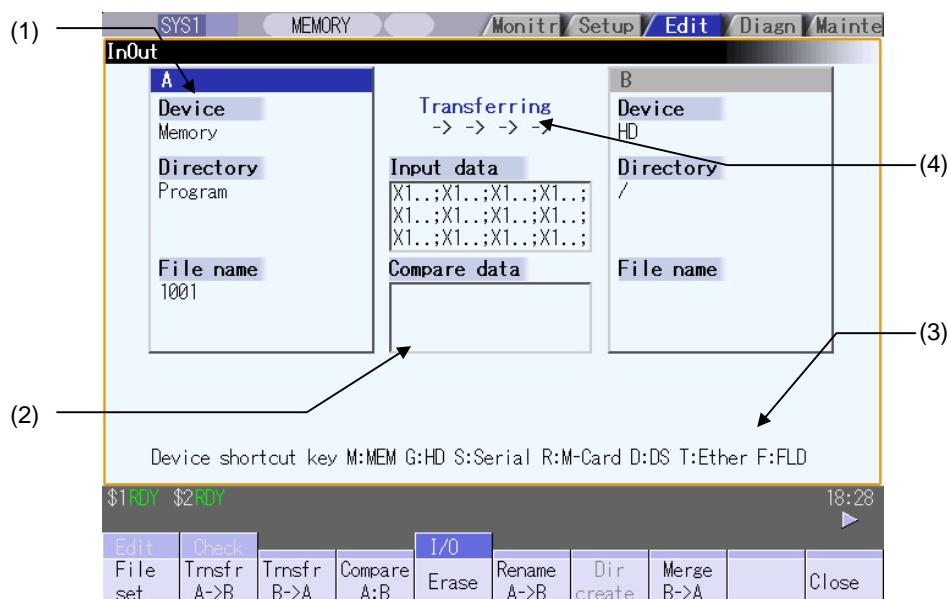
4.5 Program Input/Output

The machining program can input/output between the NC internal memory and the external input/output device. The hard disk inside the NC unit is also treated as an external device.

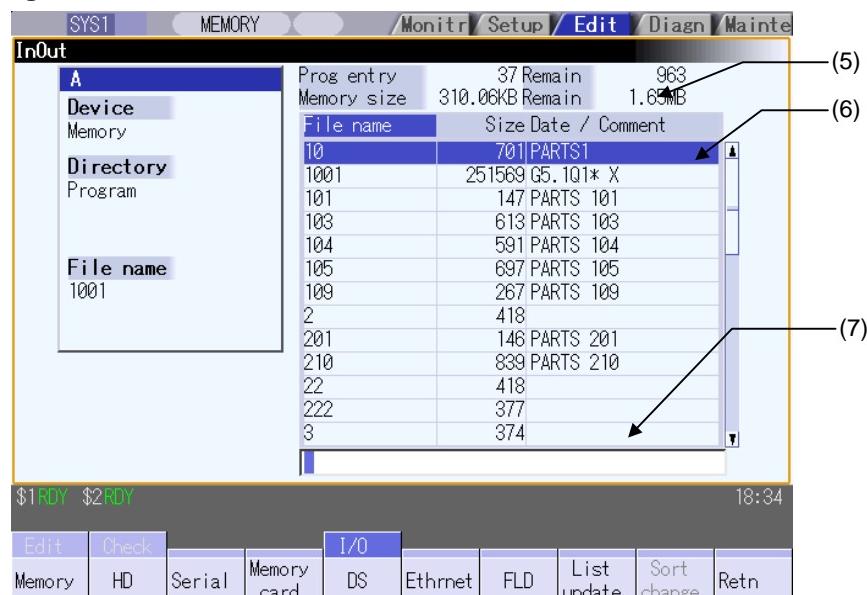
This function applies to the following devices.

- (1) Memory (NC internal memory)
- (2) HD
- (3) Serial
- (4) Memory card (front IC card)
- (5) DS (compact flash at NC)
- (6) Ethernet
- (7) FLD

<During file transmission>



<During file setting>



Display items

Display item	Details
(1) Device, directory, file name setting area	This sets the device, directory, and file name for which the transmission, compare, and erase functions are used. When the number of characters exceeds the display possible number (directory:63, file name:42), the excess is not displayed.
(2) Input/compare data display	This displays data that is being transferred or compared. If an error occurs while comparing data, the block for which the error occurred displays.
(3) Guidance display area	This displays the device name shortcut key.
(4) Process progress display section	This displays the details and data input/output direction for the process currently being performed.
(5) Capacity display section (Note 1)	This displays the file (machining program) registration count information and memory capacity information for the selected device. Number of programs registered : This displays the file (machining program) registration count. Remainder : This displays the remaining file registration count. This displays only when the memory is selected. Number of memory characters : This displays the memory character count. Remainder : This displays the remaining character count.
(6) List display section	This displays the device A or B directory contents list (directory and file name). File name : This displays the file (machining program) name. Size : This displays the file size. <DIR> displays in the case of the directory. Date/comment : The file comment (max. 17 characters) displays in the case of the memory device. The file update data displays in the case of the HD, memory card, DS, FLD, or Ethernet devices.
(7) Input area	This displays the input key.

(Note 1) Some items may not be displayed depending on the device.

Display item	Device	Memory	HD	Serial	Memory card	DS	Ethernet	FLD
Number of programs registered		○	○	×	○	○	○	○
Remainder		○	×	×	×	×	×	×
Number of memory characters		○	○	×	○	○	○ *	○
Remainder		○	○	×	○	○	×	○
List		○	○	×	○	○	○	○

○ : Displayed × : Not displayed

- When the Ethernet parameter "#97*1 Host n no total siz" is set to 1, the number of host memory characters will not appear.

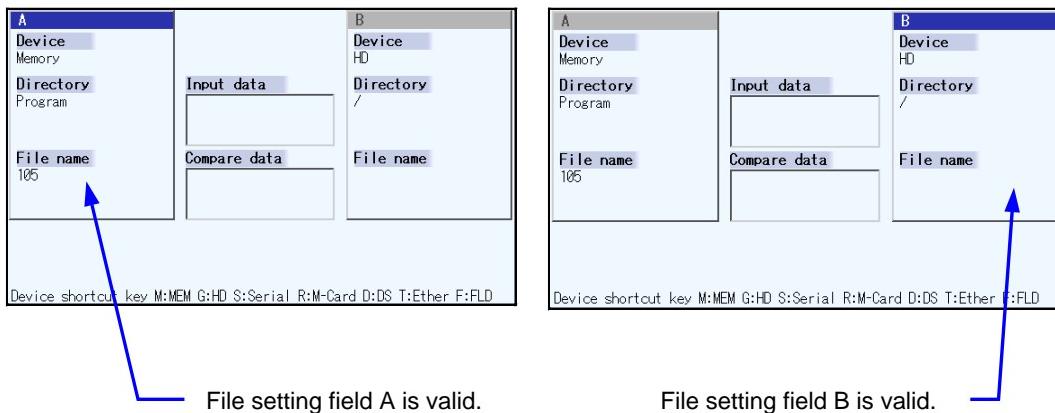
Menus

Menu	Details	Type	Reference
File set	This sets the device, directory and file name for which input/output operations are performed.	A	4.5.2 Selecting a Device, Directory, and File
Transfr A→B	This copies the file in file setting column A file to file setting column B. (The originally transferred file is not affected.)	A	4.5.3 Transferring a File
Transfr B→A	This copies the file in file setting column B file to file setting column A. (The originally transferred file is not affected.)	A	
Compare A:B	This compares the files in file setting column A and file setting column B.	B	4.5.4 Comparing Files (Compare)
Erase	This erases the selected file in file setting column.	A	4.5.5 Erasing a File
Rename A→B	This changes the name of the file in file setting column A to that of in file setting column B. (Note) The same device must be selected for A and B.	A	4.5.6 Changing a File Name (Rename)
Dir create	This creates a new directory in the selected file setting column. The directory can be created when HD, memory card, DS or FLD is selected for the device.	A	4.5.7 Creating a Directory
Merge B→A	This adds the file contents of file setting column B to file setting column A. (The file setting column B file is not affected.)	A	4.5.8 Merging a File
Close	This closes the pop-up window and quits this function.	C	
MemCrd format	The formats the memory card (front IC card). (FCU7-DA4xx/DA3xx only)	A	4.5.9 Formatting an External Device
DS format	This formats the DS.	A	
FLD format	This formats the FLD.	A	
Stop	This interrupts the process (transfer, compare, etc.) during its execution.	C	

4.5.1 Changing the Valid Area

It is necessary to enable the areas including device, directory, and file name in the file setting column A or B in order to set those items.

Change the display area using the \leftarrow , \rightarrow direction cursor keys or the $\left[\leftarrow\right], \left[\rightarrow\right]$ tab keys.



Changing file setting column B to a valid area (refer to upper right diagram)

- (1) Press the \rightarrow or \rightarrow key. \rightarrow File setting column B changes to a valid area.

Changing file setting column A to a valid area (refer to upper left diagram)

- (1) Press the \leftarrow or \leftarrow key. \rightarrow File setting column A changes to a valid area.

4.5.2 Selecting a Device, Directory, and File

This section explains the file device, directory, and file name specification methods for the file transfer and erase commands etc. performed on this screen.

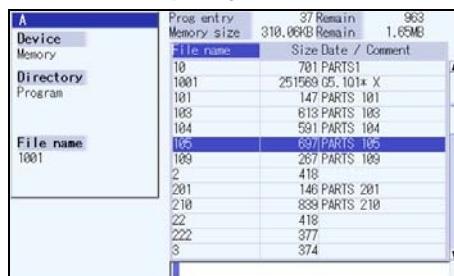
Operation method (Selecting an NC memory program)

(1) Press the **M** short cut key.

The device name changes to "Memory".
"Program" appears in the directory.

(2) Press the menu **[File set]**.

The NC memory program list and input area appear.



	File name	Size	Date / Comment
10	781 PARTS1		
1001	251569 (5, 1014 X		
101	147 PARTS 101		
103	613 PARTS 103		
104	591 PARTS 104		
105	897 PARTS 105		
109	267 PARTS 109		
2	418		
201	146 PARTS 201		
218	889 PARTS 210		
22	418		
222	377		
3	374		

The menu appears as follows.

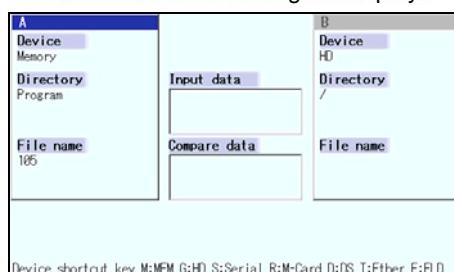
Memory	HD	Serial	Memory card	DS	Ethernet	FLD	List update	Sort change	Retn
--------	----	--------	-------------	----	----------	-----	-------------	-------------	------

By pressing the operation menu at this point, it is possible to change the device.

When selecting the file name from the list

(3) Move the cursor to the file name to be selected, and fix.
[↑], [↓], [INPUT]

The selected file name appears.
The list and input area are cleared, and the screen returns to the original display.
The menu returns to its original display.



When inputting the file name from the input area:

(3) Input the file name.
10013 **[INPUT]**

The input file name appears.
The list and input area are cleared, and the screen returns to the original display.
The menu returns to its original display.

Designating multiple files

A wildcard (*) can be used for the file name.

By using a wildcard, multiple files can be transferred, compared, and erased at one time.

[Ex. 1] When programs 1 to 1000 exist in the NC memory.

Designate "*" in the file name : The target program is "1 to 1000".

Designate "*.*" in the file name : There is no target program.

Designate "1*" in the file name : The target program is "1, 10 to 19, 100 to 199, 1000".

Designate "1.*" in the file name: There is no target program.

Designate "*1" in the file name : The target program is that where the position of the 1 is "1".

(1, 11, 21, 31,101, 111,981, 991)

Designate "*1*" in the file name : The target program is all of the programs containing "1".

(1, 10 to 19, 21, 31,100 to 199, 201, 210,981, 991,1000)

Designate "1*1" in the file name: The target program is "11, 111, 121, 131, 141, 151, 161, 171, 181, 191".

[Ex. 2] When programs 1.PRG to 1000.PRG, and 1 to 1000 exist in the HD.

Designate "*" in the file name : The target program is "1 to 1000".

Designate "*.*" in the file name : The target program is "1.PRG to 1000.PRG".

Designate "1*" in the file name : The target program is "1, 10 to 19, 100 to 199, 1000".

Designate "1.*" in the file name: The target program is "1.PRG, 10.PRG to 19.PRG, 100.PRG to 199.PRG, 1000.PRG".

Operation method (Selecting a file from a device other than the NC memory)

(1) Press a device selection shortcut key.

(Example) **G**

The device name changes to "HD".

The root directory (/) appears in the directory.

(2) Press the menu **[File set]**.

The HD program list and input area appear.

Device	Memory entry Memory size	28 Remain 16,01MB Remain 3,400B
HD	Size Date / Comment	
/		
File name		
1001	251572 Aug 01 18:28 2004	
2	421 Jun 22 09:44 2004	
22	421 Jun 22 09:36 2004	
222	388 Apr 23 16:21 2004	
3	377 Jun 07 13:09 2004	
348	183 Jul 08 15:26 2004	
4	385 Jun 22 09:36 2004	
5	320 Jul 22 09:37 2004	
51	1575 May 21 11:33 2003	
777	4911 Jul 22 10:49 2004	
888	4958 Jul 22 10:53 2004	

A menu similar to the following appears.

Memory	HD	Serial	Memory card	DS	Ethernet	FLD	List update	Sort change	Retn
--------	----	--------	-------------	----	----------	-----	-------------	-------------	------

By pressing the operation menu at this time, the device can be changed.

When selecting a directory from the list.

(3) Move the cursor to the directory to be selected and fix.

[↑], [↓], [INPUT]

The directory selected in the directory column appears.
The contents of the selected directory appear in the list.
Select ".." to move to one directory above.
There is no change when "." is selected.

Repeat this operation until the cursor arrives at the target directory.

Next, refer to operation (4).

When inputting a directory from the input area:

- (3) Input the directory path.
(Example) /PRG/PRECUT **[INPUT]**



The input directory path appears in the directory column.

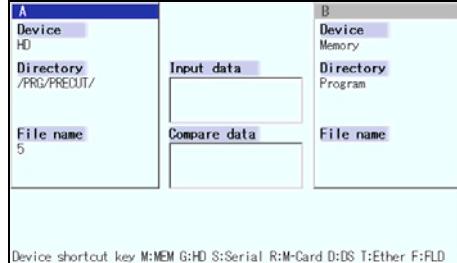
When selecting the file name from the list:

- (4) Move the cursor to the file name to be selected and fix.
[↑], [↓], [INPUT]



The file name selected in the file name column appears.
The list and input area are cleared, and the screen returns to the original display.

The menu display returns to normal.



When inputting a file name from the input area:

- (4) Input the file name.
10013.PRG [INPUT]



The file name input in the file name column appears.
The list and input area are cleared, and the screen returns to the original display.
The menu display returns to normal.

4.5.3 Transferring a File

This section explains the method used to transfer files between different devices, or between the same device.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

4.5.4 Comparing Files (Compare)

This chapter explains method used compare files after transferring.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

4.5.5 Erasing a File

This chapter explains the method used to delete files.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

4.5.6 Changing a File Name (Rename)

This section explains the method used to change the file name.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

4.5.7 Creating a Directory

This section explains the method used to newly create a directory.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

4.5.8 Merging a File

This section explains the method used to add a file in file setting column B to a file in file setting column A.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

4.5.9 Formatting an External Device

This section explains the method to format the external devices.

Operation method (Formatting a memory card)

- (1) Press the menu [MemCrd format]. → A message confirming the formatting appears.
- (2) Press the [Y] or [INPUT] key. → The memory card is formatted.
A message appears when the formatting is completed.

(Note 1) The memory card and data server are formatted with FAT16.

(Note 2) The volume label is set when the memory card is formatted.

Operation method (Formatting a DS)

First, press the menu [DS format]. The following operations are the same as "Formatting a memory card".

(Note 1) Only the DS formatted with FAT or FAT32 can be used. The DS with NTFS cannot be used.

(Note 2) As for the DS formatted with NTFS, reformat it with FAT or FAT32 by Windows to use.

(NC cannot convert NTFS partition to FAT or FAT32.)

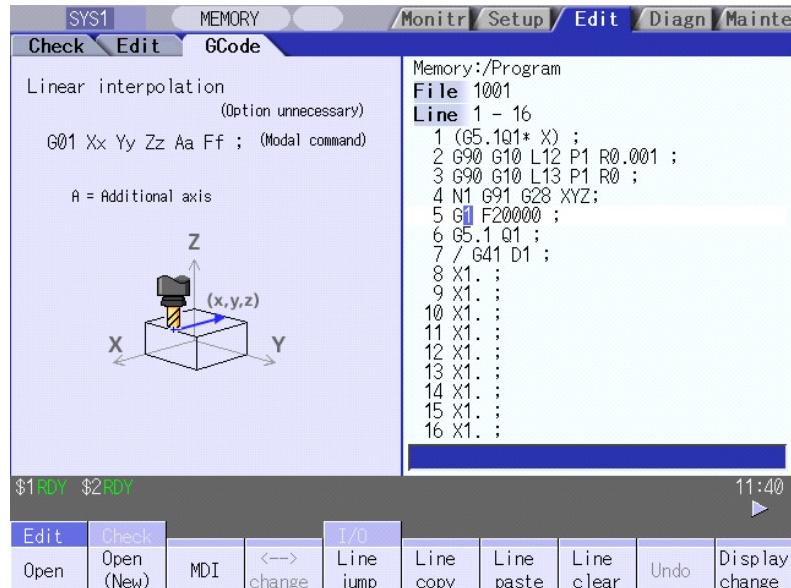
(Note 3) The volume label is not set even when the DS is formatted.

4.6 G Code Guidance

G code guidance is a function that shows the command format details or the outline of its operation for the G code being edited while creating or editing the machining program. With this function, the G code format can be confirmed immediately. G code guidance is also displayed in the same manner even when MDI program is displayed.

G code guidance function is valid for the M system.

<G code guidance>



The contents displayed on the G code guidance area depends on the cursor position on the Edit screen, and is refreshed when moving the cursor.

The G code that meets following conditions are displayed in this area.

- G code that exists between the head of block and cursor position including the cursor position.
- G code that exists immediately before the cursor if multiple G codes meet the above condition.

Specific example

G91 G17 ;	→	The guidance will not be refreshed because the cursor is out of the block.
G91 G17 ;	→	The guidance for G17 will be displayed.
G91 G17 ;	→	The guidance for G91 will be displayed.
G91 G00 X100. Y100. ;	→	The guidance for G00 will be displayed because G00 is the nearest G code to the cursor.

G codes displayed in the G code guidance area (EDIT)

For Example:

Press **EDIT** key.

Creating a machining program

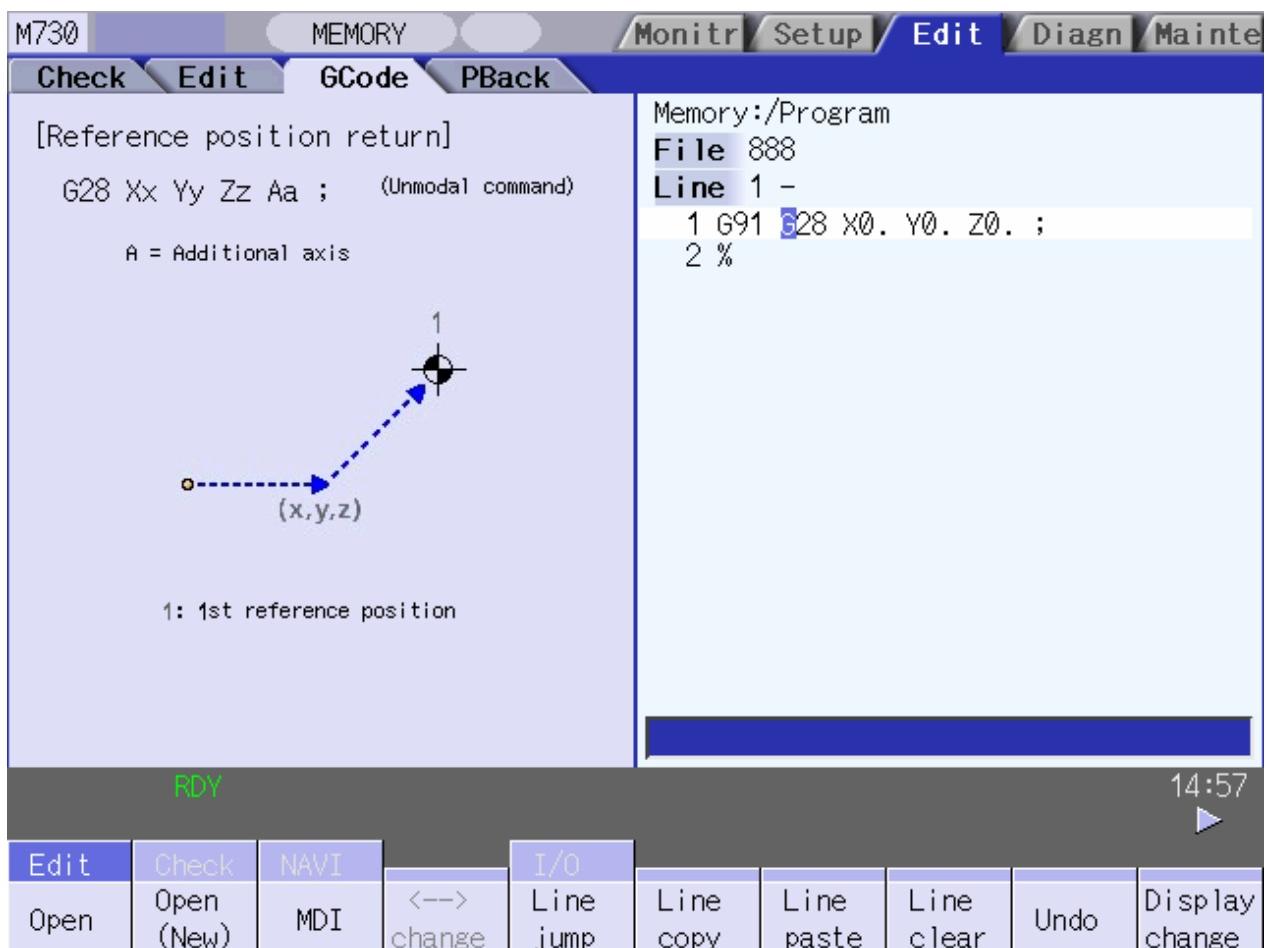
Press **OPEN (NEW)** and select **MEMORY**

Press **Display Change** for GCode monitor display

G91 G28 X0. Y0. Z0. ;



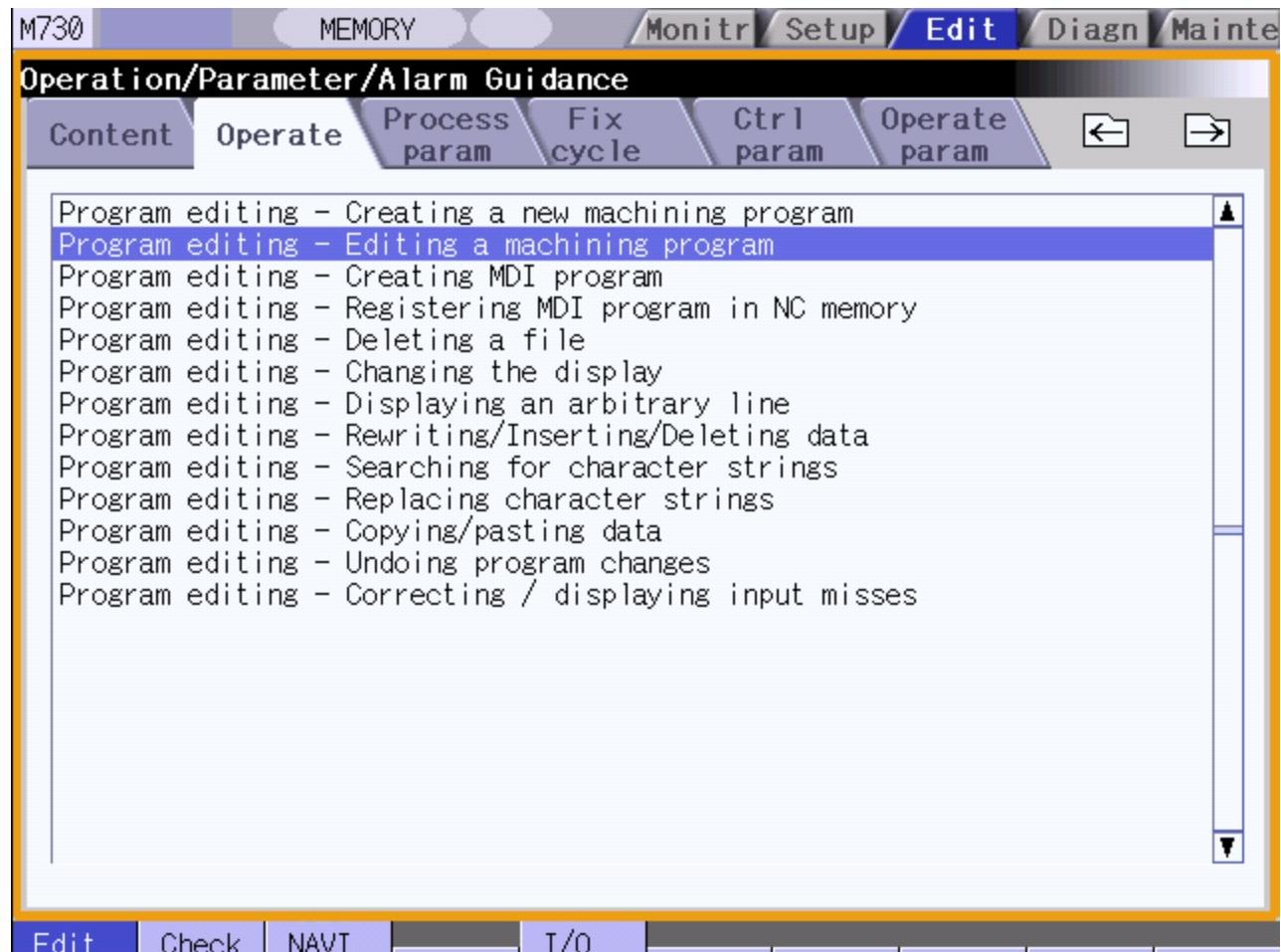
The guidance for G28 will be displayed as follow:



4.7 Help Function

4.7.1 Edit Help

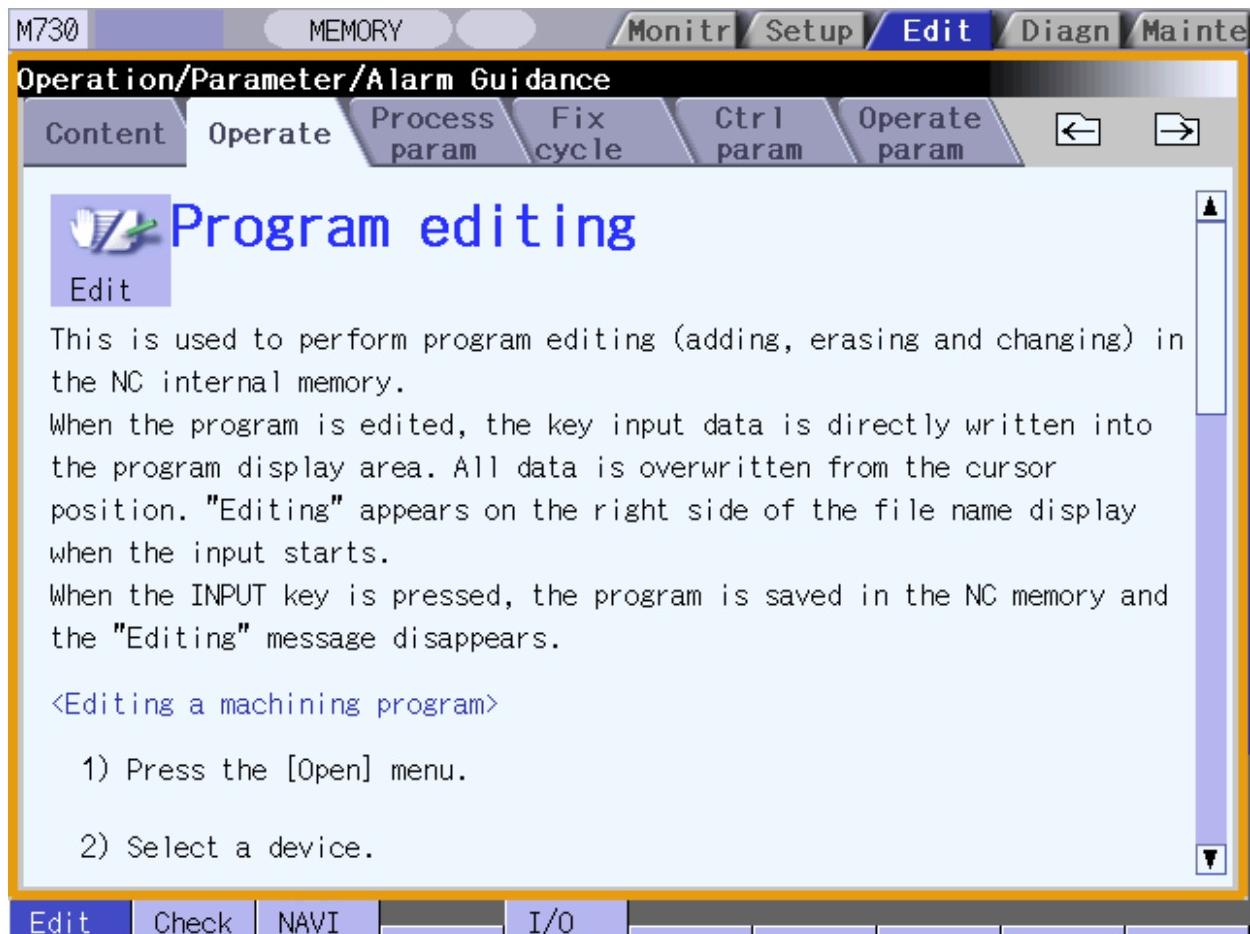
M700 has build-in help function in controller, the follow step show you how operate help function.



Operation method

For example : Program Editing help function.

- (1) Press EDIT key → Display change move cursor to specify item.
- (2) Press [?] key → will be displayed the help screen.
- (3) move cursor down and press INPUT key will be displayed the following screen.



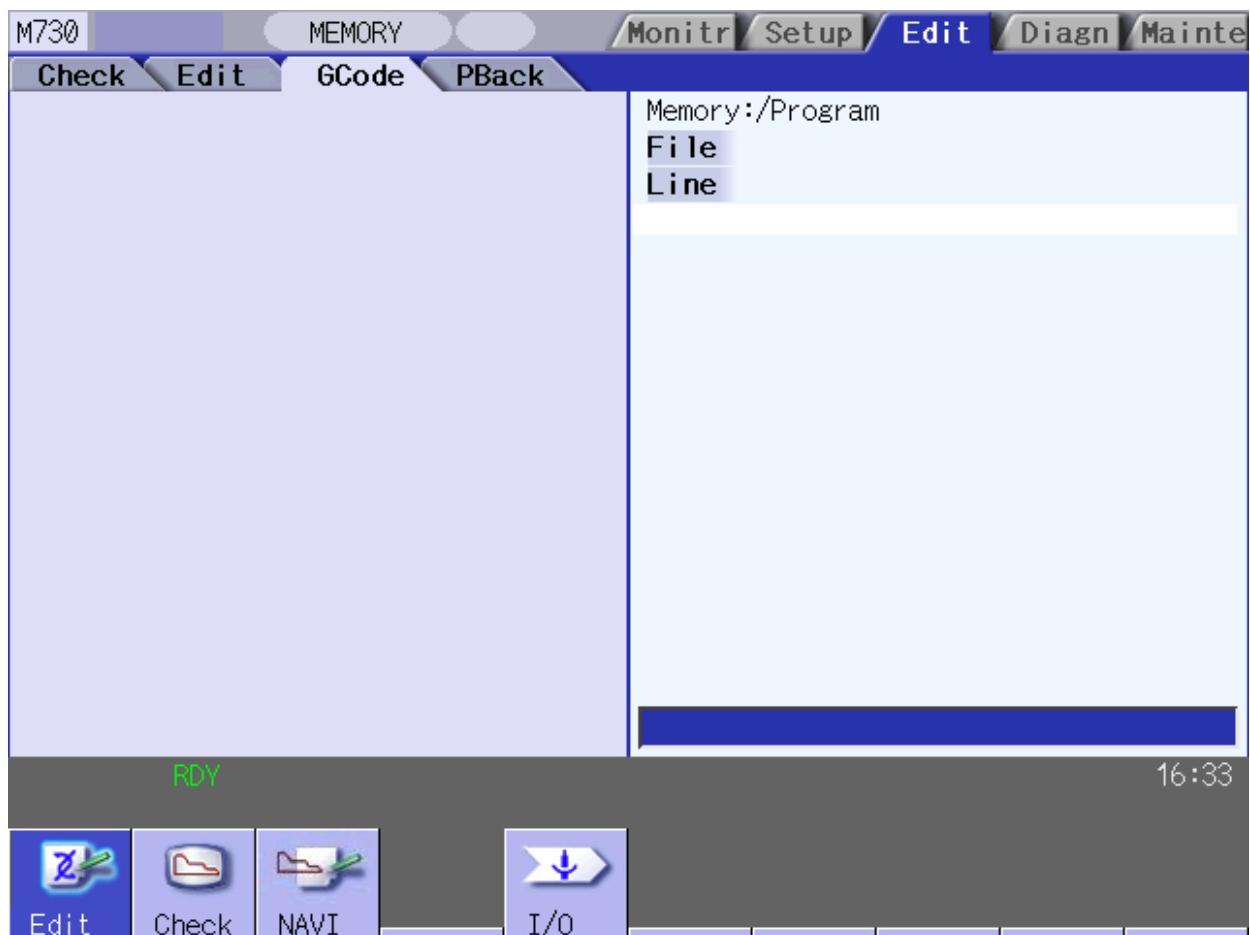
4.7.2 NAVI MILL/LATHE (Auto-simple programming function)

NAVI MILL/LATHE is an auto-simple programming function, the detail operation please see NAVI MILL/Lathe Programming manual.

The following screens are for NAVI MILL function :

Operation method

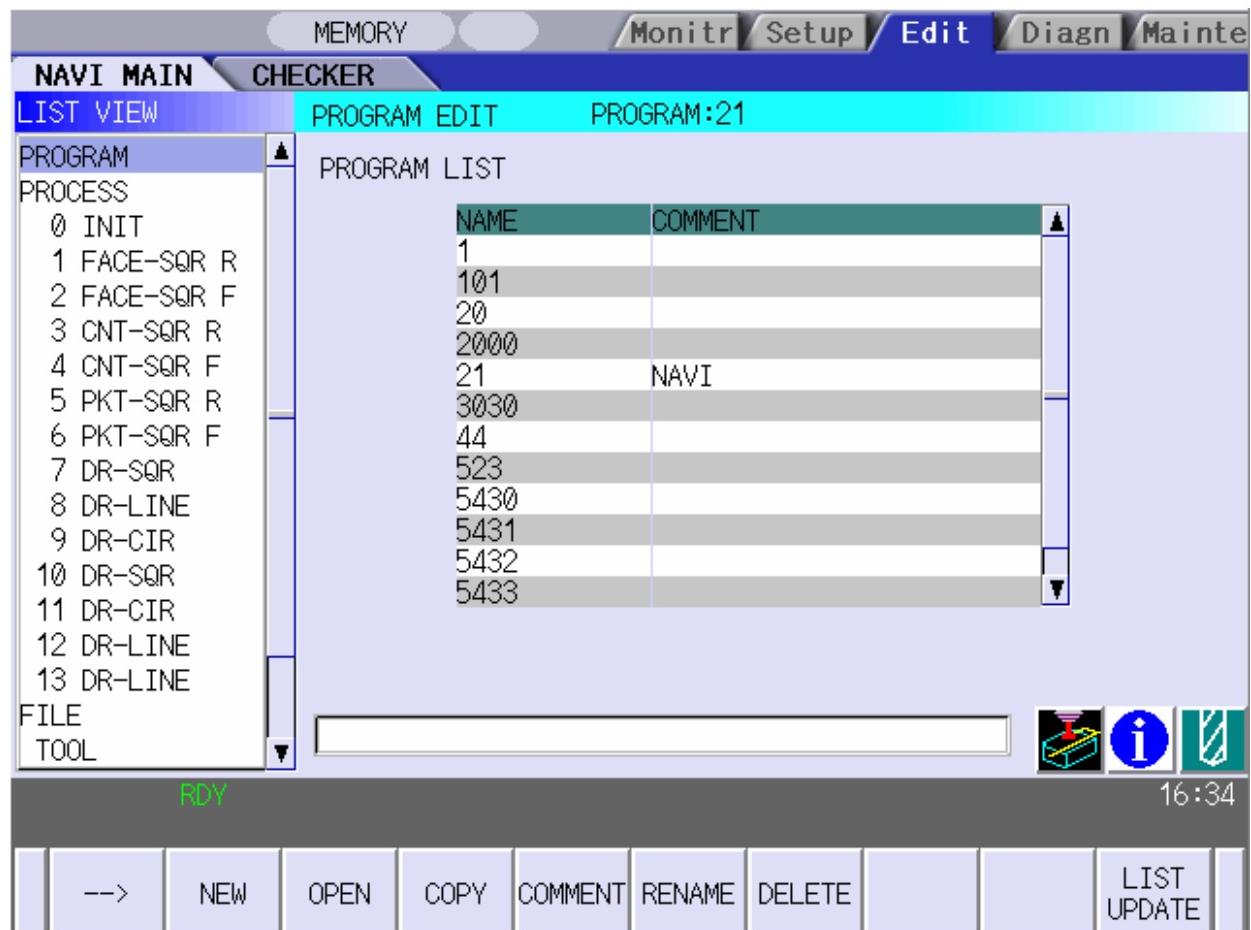
- (1) Press [EDIT] key → [NAVI] function.



4. Edit Screens

4.7 Help Function

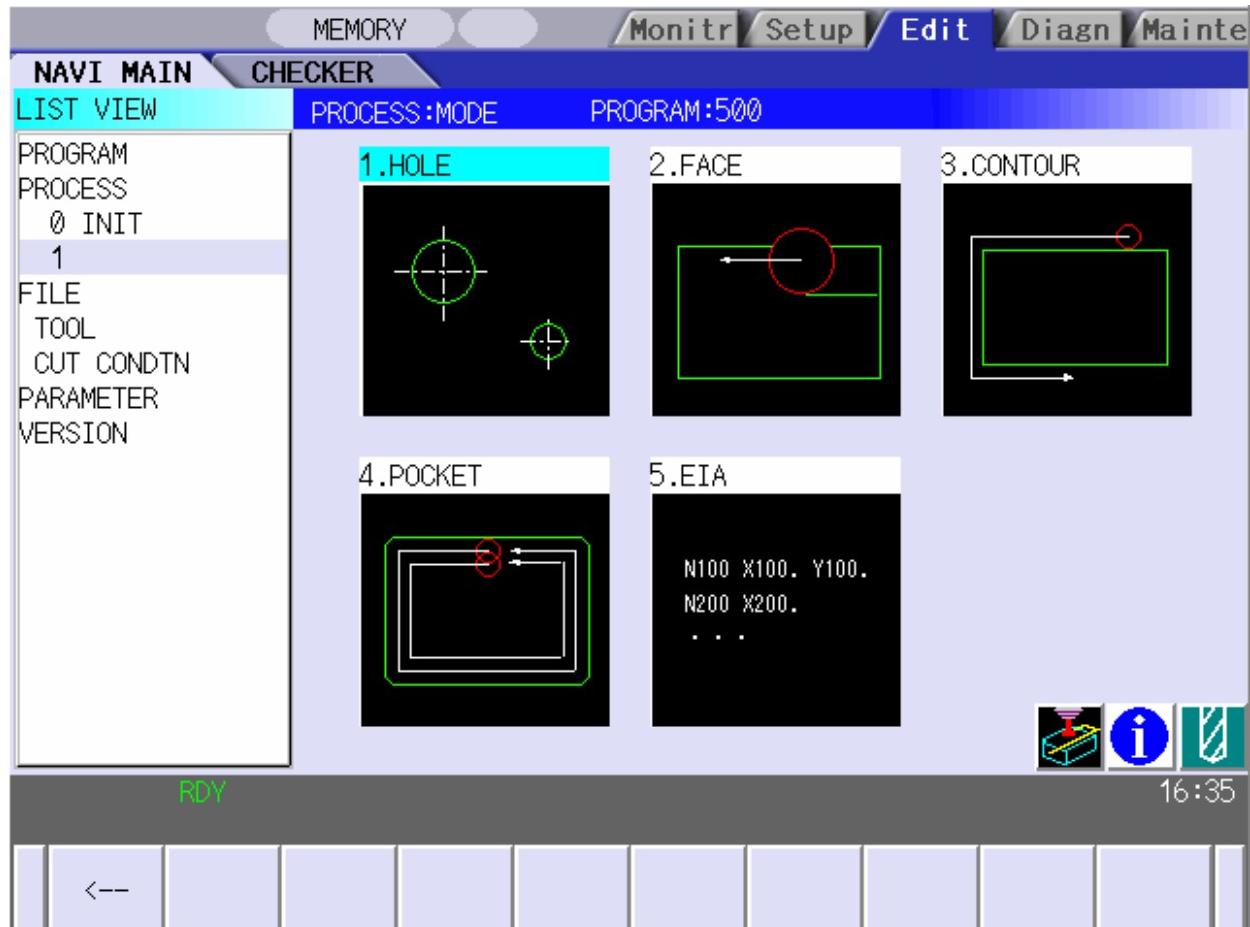
(2) Press [NEW] key → input program no. O () Comment ()



4. Edit Screens

4.7 Help Function

(3) move cursor down to INIT and press [NEW] key will be displayed the following PROCESS screen.



(4) Selection [1. HOLE] for hole drilling function.

Please see NAVI MILL/LATHE instruction manual for detail.

Diagnosis Screen

5. Diagnosis Screens

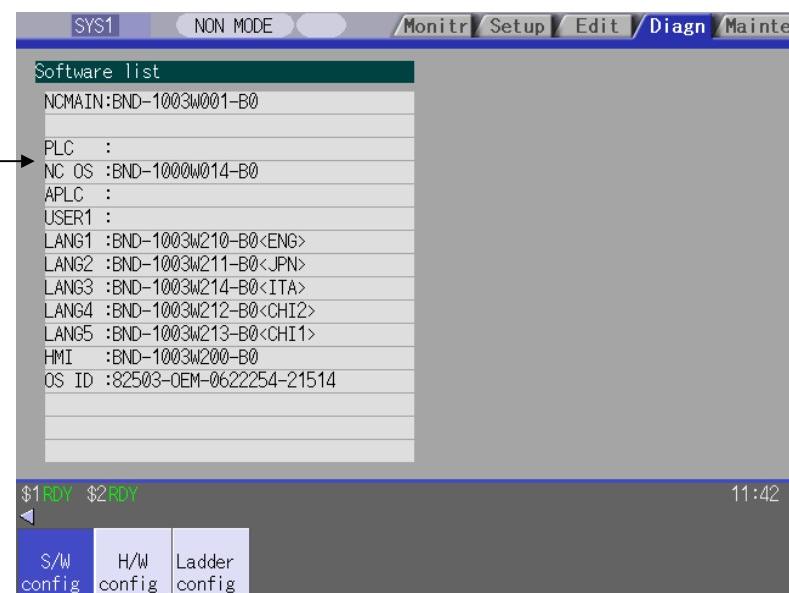
5.1 System Configuration Screen

5. Diagnosis Screens

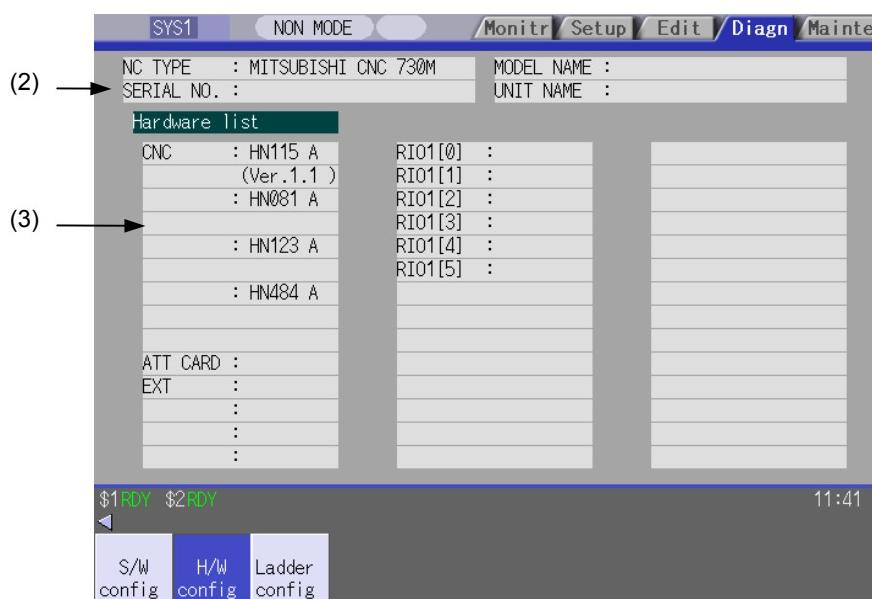
5.1 System Configuration Screen

The hardware configuration (card name and sub-number), software configuration (software number and sub-number), and PLC program configuration (file name, file label, and execution type) are displayed in this screen.

■ Software configuration



■ Hardware configuration



5. Diagnosis Screens

5.1 System Configuration Screen

Display items

Display item	Details	
(1) Software list	This displays a list of the software being used.	
(2) NC serial No.	NC TYPE: MITSUBISHI CNC 75XL	NC type (The model names include 730M, 735M, 750L and 755L.)
	MODEL NAME: FCA730	Model name (The model names include FCA720, FCA730 and FCA750.)
	SERIAL NO.: M7123456789	Serial No.
	UNIT NAME: FCU7-MU011	Unit type (The unit type differs according to the model.)
(3) Hardware list (to the next page)	This displays each hardware name.	
	CNC : HN115A : HN081A : HN122A : HN48xA	Main card with LANCPU Power card CPU card (Differs between M720, M730, M750) Memory card (Differs between M720, M730, M750 (hardware option)) The CNC unit is composed of four PCBs. Bus connections are used with all cards.
	ATT CARD : HN392A	Card enclosed with CNC card. The operation board I/O unit are connected to it. The operation board I/O unit uses a remote IO connection.
	EXT : EX891 : HR553 : HR577	Back panel Extension unit Extension unit The extension unit is a hardware option. The PLC high-speed engine or PROFIBUS card, etc. is connected. The back panel + up to three cards are displayed.

Display item	Details	
(from the previous page)	RI01 [n] : RI02 [n] : RI03 [n] :	Remote IO unit 1 (n = 1 to 8) Remote IO unit 2 (n = 1 to 8) Remote IO unit 3 (n = 1 to 6) There are up to three channels. The 7th and 8th station of the RIO3 channel is fixed for use with the handle I/F and is not displayed.

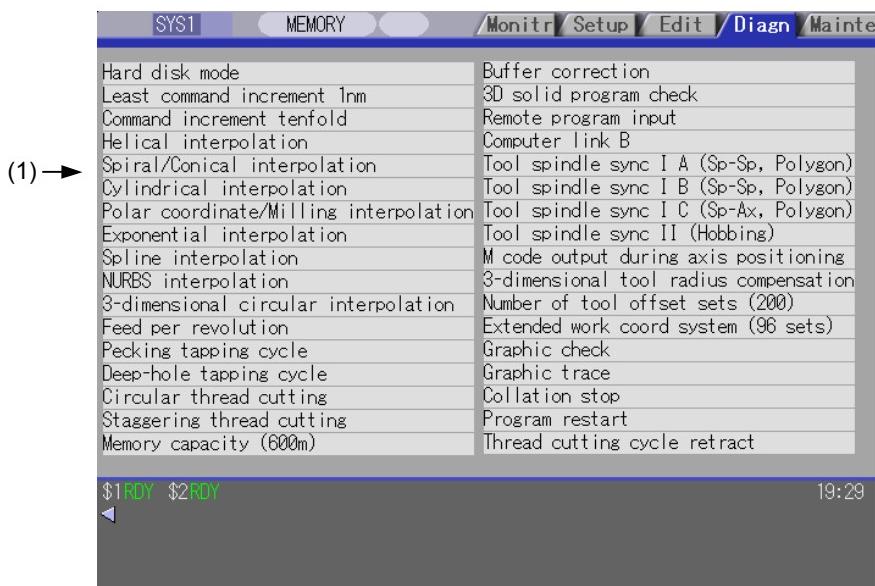
Menus

Menu	Details	Type	Reference
S/W config	This displays the software list.	C	
H/W config	This displays the hardware list.	C	
Ladder config	This displays the PLC program list (file name, file label, and execution type	C	

5.2 Option Display Screen

The contents of the options registered in the NC are displayed in this screen.

The option items are displayed by name. If all of the options cannot be seen in one screen, the rest of options can be displayed by pressing the page changeover key.



Display items

Display item	Details
(1) Option items	The list of currently usable options are displayed. The options set when the power is turned ON are displayed.

5. Diagnosis Screens

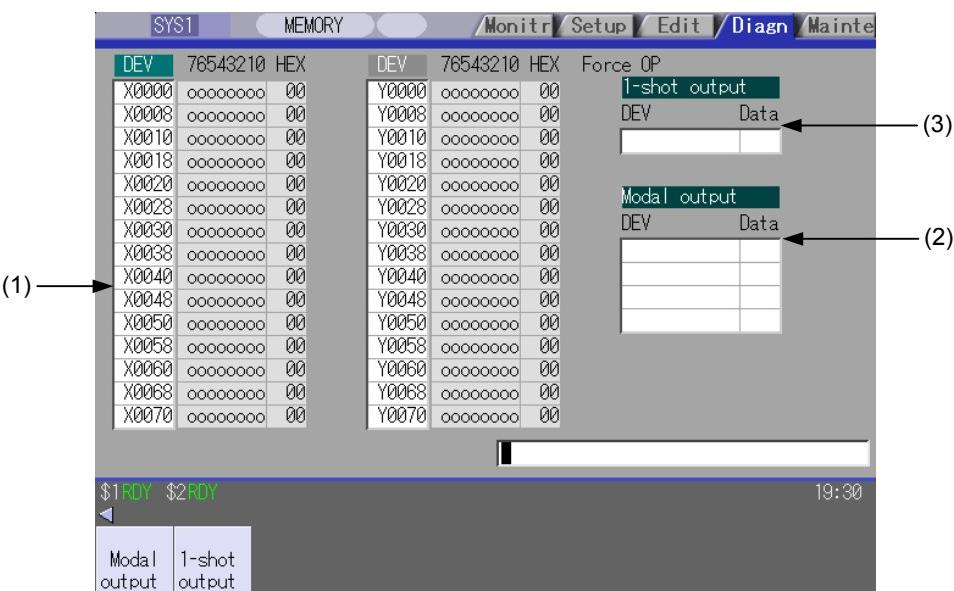
5.3 I/F Diagnosis Screen

5.3 I/F Diagnosis Screen

The various input/output signals for the PLC (Programmable Logic Controller) control can be displayed and set in this screen.

These signals can be used in confirmation of the machine sequence operation during PLC development, and in confirmation and forced output, etc., of the input/output data between the NC and PLC.

(Note) Pay close attention to the sequence operation when using these functions during machine operation.



Display items

Display item	Details
(1) Device No. and input/ output signal value (binary/ hexadecimal display)	This displays the data from the device Nos. designated in the setting area in numerical order. The data is displayed as binary (bit units) and hexadecimal values. Individual device Nos. can be displayed separately in the left area and right area. Select the valid area with the and key when operations such as display changeover and data setting are carried out. Each X, Y, M, F, L, SM, TI, TO, TS, TA, STI, STO, STS, STA, CI, CO, CS, CA, D, R, SB, B, V, SW, SD, W, P, K, and H data is the target data.
(2) Modal output	This displays the data and device to carry out modal output. The details to be defined are set here when carrying out the modal type forced output of PLC interface signals. Refer to "5.3.2 Carrying Out Modal Output" for details.
(3) 1-shot output	This displays the data and device to carry out one-shot output. The details to be defined are set here when carrying out the one-shot type forced output of PLC interface signals. Refer to "5.3.3 Carrying Out One-shot Output" for details.

Menus

Menu	Details	Type	Reference
Modal output	This changes the setting area to an input standby status. The signal is forcibly output (modal).	A	5.3.2 Carrying out modal output
1-shot output	This changes the setting area to an input standby status. The signal is forcibly output (one-shot).	A	5.3.3 Carrying out one-shot output

5.3.1 Displaying the PLC Device Data

The various status signals and register data used in the PLC can be monitored and displayed.

When this screen is first selected, the respective 16-byte amounts of input/output data are displayed from device "X0000" on the left display area, and from device "Y0000" on the right side.

This screen constantly monitors and displays the PLC signal statuses. Consequently, when signals are changed in the PLC, the display is changed according to the changes.

Note that because time differences occur between the PLC signal change and the signal display, there may be a delay in the display. The machine may also not be able to correspond to extremely brief signal changes.

Displaying the data of a arbitrary device No. "X0020"

(1) Press the menu tab key , and select the area to display the data.

(2) Set the device No. (X0020), and press the .

→ The device "X0020" appears at the head of the valid display area.

DEV	76543210	HEX	DEV	76543210	HEX
X0020	11111111	FF	Y0000	oooooooo	00
X0028	01000000	40	Y0008	oooooooo	01
X0030	00001110	0E	Y0010	oooooooo	00
X0038	00000000	00	Y0018	oooooooo	00

(Note) When setting the device No., an error will occur if a number exceeding the specifications or an illegal address is set.

Changing the display with the page keys

The valid area device Nos. change in page units when is pressed. Changing of the pages stops within the range of device numbers of which the device has.

(1) Press the .

→ The data is displayed from the next number currently displayed.

DEV	76543210	HEX	DEV	76543210	HEX
X0000	10000001	81	Y0000	oooooooo	00
X0008	00000010	02	Y0008	oooooooo	01
X0010	00001111	0F	Y0010	oooooooo	00
X0018	10011111	9F	Y0018	oooooooo	00



DEV	76543210	HEX	DEV	76543210	HEX
X0080	11111111	FF	Y0000	oooooooo	00
X0088	01000000	40	Y0008	oooooooo	01
X0090	00001111	0F	Y0010	oooooooo	00
X0098	00000000	00	Y0018	oooooooo	00

5.3.2 Carrying Out Modal Output

Modal type forced output of PLC interface signals is carried out. Once set, this data is held until cancelled, the power is turned ON/OFF, or other data is overwritten. There are four sets of devices that modally output. If this number is exceeded, the previously existing data is overwritten.

Menus used in modal output

Menu	Details	Type	Reference
Modal clear	This releases the modal output for the device at the cursor position in the modal output area. The released data is erased from this area.	C	"Releasing the modal output"

Modally outputting data "1" to device "X0048"

- (1) Press the menu key **Modal output**. → The modal output mode is entered, and the cursor appears at the modal output area.
- (2) Using the **↑** and **↓** keys, move the cursor to the setting position.
- (3) Set the device and data, and press the **INPUT** key.
X0048/1 INPUT → Modal output is executed, and the cursor disappears. The data that was in the cursor position is overwritten by the input data, and is invalidated.
The modal output mode is cancelled by pressing the **◀** key.

(Note 1) The data of the modally output device is displayed in order in the selected area.
This modal output is held until the output is cancelled or the power is turned OFF.

(Note 2) When no data is set (Ex."X0048/", "X0048"), the operation message "Setting Data not found" is displayed.

Releasing the modal output

- (1) Press the menu key **Modal output**. → The modal output mode is entered, and the cursor appears at the modal output area.
- (2) Using the **↑** and **↓** keys, move the cursor to the data to be released.
- (3) Press the menu key **Modal clear**. → The data that was in the cursor position is released from modal output. The "DEV" and "Data" columns become blank.
The modal output mode is cancelled by pressing the **◀** key.



CAUTION

Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen during machine operation.

5.3.3 Carrying Out One-shot Output

The one-shot type PLC interface signal forced output is forcibly output only once during the screen operations. Thus, it may not be possible to confirm the PLC interface signals updated with the PLC on the screen.

One-shot outputting data "1" to device "X0042"

- (1) Press the menu key **[1-shot output]**. → The one-shot output mode is entered, and the cursor appears at the one-shot output area.
- (2) Set the device and data, press the **[INPUT]** key.
X0042/1 [INPUT] → The input data is overwritten in the one-shot output area, and is one-shot output. The cursor in the one-shot output area disappears.
The data of the one-shot output device is displayed in order in the selected area.
The one-shot output mode is cancelled by pressing the **[CLEAR]** key.

- (Note 1)** Because the input signal (X, etc.) to the PLC is updated at the head of each PLC cycle, the machine immediately returns to the normal state, even if one-shot type forced output is carried out.
- (Note 2)** When no data is set (Ex.: "X0048/", "X0048"), the operation message "Setting Data not found" is displayed.



CAUTION

⚠ Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen during mach.

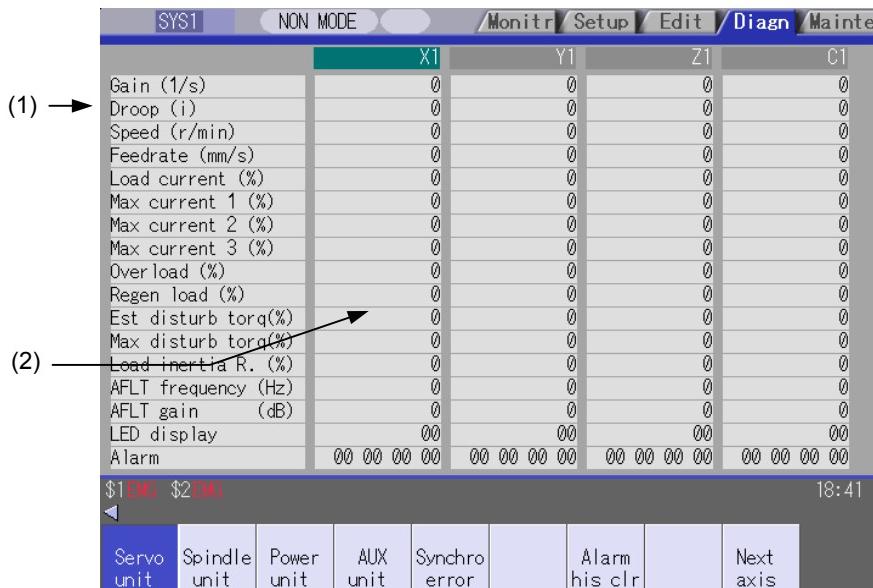
5. Diagnosis Screens

5.4 Drive Monitor Screen

5.4 Drive Monitor Screen

The diagnosis information from the drive section can be monitored with this screen.

Servo axis unit, spindle unit, power supply unit and synchronous error information is displayed.



Display items

Display item	Details
(1) Monitoring items	This displays each item being monitored. The display is changed using the page changeover keys.
(2) Data of each axis and unit	This displays the data of each axis or each unit being monitored.

Menus

Menu	Details	Type	Reference
Servo unit	This displays the diagnosis information of the servo unit in the data display area.	B	5.4.1 Servo axis unit display items
Spindle unit	This displays the diagnosis information of the spindle unit in the data display area.	B	5.4.2 Spindle unit display items
Power unit	This displays the diagnosis information of the power supply unit in the data display area.	B	5.4.3 Display items for the power supply unit
AUX unit	This monitors the various data related to the auxiliary axis (MR-J2-CT) servo control. The menu appears and operation is possible only when there is one or more valid auxiliary axes in the auxiliary axis control.	B	5.4.4 Display items for the auxiliary axis unit
Synchro error	This displays the diagnosis information of the synchronous error in the data display area. The menu appears and operation is possible only when the synchronous control axis option is valid.	B	5.4.5 Display items for the synchronous error
Alarm his clr	This clears the diagnosis information alarm history.	A	5.4.6 Clearing the alarm history
Next axis	This displays the data for the next four axes. The menu appears and operation is possible only when diagnosis information for five or more axes is displayed.	C	

5. Diagnosis Screens

5.4 Drive Monitor Screen

5.4.1 Servo Axis Unit Display Items

The various data related to the servo axis (NC axis, PLC axis) is monitored.

To reference, change the display items using the key and key.

SYS1	NON MODE	Monitr	Setup	Edit	Diagn	Mainte
	X1	Y1	Z1	C1		
Gain (1/s)	0	0	0	0		
Droop (i)	0	0	0	0		
Speed (r/min)	0	0	0	0		
Feedrate (mm/s)	0	0	0	0		
Load current (%)	0	0	0	0		
Max current 1 (%)	0	0	0	0		
Max current 2 (%)	0	0	0	0		
Max current 3 (%)	0	0	0	0		
Over load (%)	0	0	0	0		
Regen load (%)	0	0	0	0		
Est disturb torq(%)	0	0	0	0		
Max disturb torq(%)	0	0	0	0		
Load inertia R. (%)	0	0	0	0		
AFLT frequency (Hz)	0	0	0	0		
AFLT gain (dB)	0	0	0	0		
LED display	00	00	00	00		
Alarm	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00		
\$1EMG \$2EMG					18:41	

The axis name set in the base axis specification parameter "#1022 axname2" appears at the axis name.

5.4.2 Spindle Unit Display Items

The various data related to the spindle is monitored.

Change the display items using the key and key to refer to the data.

SYS1	NON MODE	Monitr	Setup	Edit	Diagn	Mainte
	\$1					
Gain (1/s)	0					
Droop (i)	0					
Speed (r/min)	0					
Load (%)	0					
Max current 1 (%)	0					
Max current 2 (%)	0					
Max current 3 (%)	0					
Over load (%)	0					
Regen load (%)	0					
Est disturb torq(%)	0					
Max disturb torq(%)	0					
Load inertia R. (%)	0					
AFLT frequency (Hz)	0					
AFLT gain (dB)	0					
LED display	00					
Alarm	00 00 00 00					
Cycle counter (p)	0					
\$1EMG \$2EMG					18:42	

5. Diagnosis Screens

5.4 Drive Monitor Screen

5.4.3 Display Items for the Power Supply Unit

The various data related to the power supply is monitored.

Change the display items using the key and key to refer to the data.

SYS1	NON MODE	Monit	Setup	Edit	Diagn	Mainte
	PW1					
Unit type						
Unit serial No.						
Software version						
Connected drive						
Recovery energy(KW)	0					
Pw. sply volt(Vrms)	0					
PN bus voltage (V)	0					
Min PN bus volt (V)	0					
Min PN current (%)	0					
Bus current (%)	0					
Max current1 (%)	0					
Max current2 (%)	0					
Max rgn current1(%)	0					
Max rgn current2(%)	0					
No. of instant stop	0					
Work time	0					

\$1EMG \$2EMG 18:43

Servo unit	Spindle unit	Power unit	AUX unit	Synchro error	Alarm his clr	Next axis
------------	--------------	------------	----------	---------------	---------------	-----------

5.4.4 Display Items for the Auxiliary Axis Unit

"Auxiliary axis unit" appears only when there is one or more valid auxiliary axis. (Base common parameter "#1044 auxno" is "1" or more).

The various data related to the auxiliary axis (MR-J2-CT) servo control is monitored.

For reference, change the display items using the key and key.

SYS1	NON MODE	Monit	Setup	Edit	Diagn	Mainte
	AUX1					
Droop (i)	0					
Speed (r/min)	0					
Load current (%)	0					
Max current 1 (%)	0					
Max current 2 (%)	0					
Motor load (%)	0					
Regen load (%)	0					
Alarm 1						
Alarm 2						
Alarm 3						
Alarm 4						
Current station No.	0					
Current posn	0.000					
Inst station No.	1					
Inst posn	0.000					
Posn con gain 1	0					
Speed con gain 1	0					

\$1EMG \$2EMG 18:43

Servo unit	Spindle unit	Power unit	AUX unit	Synchro error	Alarm his clr	Next axis
------------	--------------	------------	----------	---------------	---------------	-----------

Data for the number of axes (up to four) set with the base common parameter "#1044 auxno (No. of connected MR-J2-CT units)" is displayed.

5.4.5 Display Items for the Synchronous Error

The "Synchronous error" appears only when the synchronous control axis option is valid. The various data related to the synchronous error is monitored.



Display items

Display item	Details
Slave axis	This displays the slave axis name which is controlled following the master axis. The axis name corresponding to the axis No. set in the axis specification parameter "#1068 slavno (slave axis No.)" is displayed. The name set in the base axis specification parameter "#1022 axname2 (No. 2 axis name)" is displayed for the slave axis.
Command error	This is the deviation of the slave axis machine position in respect to the master axis. The error of the commanded position to the servo control section before pitch error compensation, relative position compensation and backlash compensation is displayed. If this error occurs, the parameters that should be the same for the synchronous axes are different. Command error = Command s - command m - Δ Command s : Slave axis commanded position Command m : Master axis commanded position Δ : Command s - command m at start of synchronous control
FB error	This is the deviation of the slave axis feedback position in respect to the feedback position from the master axis servomotor. The actual error of the machine position is displayed. The synchronous error check is carried out on this error. FB error = FBs - FBm - Δ FBs : Slave axis feedback position FBm : Master axis feedback position Δ : FBs - FBm at start of synchronous control
FB error MAX1	This displays the maximum FB error after the start of the synchronous control.
FB error MAX2	This displays the maximum FB error approx. every 30 seconds after the start of the synchronous control.
Machine posn	This displays the commanded machine position for the master axis.

5.4.6 Clearing the Alarm History

Operation method

(1) Press the menu [Servo unit] or [Spindle unit].

(2) Using the menu [Next axis], tab keys and , select the axis (device) from which to clear the alarm history.

(3) Press the menu [Alarm his clr].



The menu is highlighted, and a message appears to confirm the erasing.

The alarm history1: Time appears at the head.

	X1	Y1	Z1	C1
Alarm hist 1:Time	1	1	00	00
1:Alarm	12	11	00	00
2:Time	2	1	0	0
2:Alarm	23	22	00	00
3:Time	1	2	0	0
3:Alarm	34	33	00	00
4:Time	2	2	0	0
4:Alarm	45	44	00	00
5:Time	0	3	0	0
5:Alarm	00	55	00	00
6:Time	0	0	0	0
6:Alarm	00	00	00	00
7:Time	0	0	0	0
7:Alarm	00	00	00	00
8:Time	0	0	0	0
8:Alarm	00	00	00	00
Maint hist 1				

\$1.00 \$2.00 Erase? (Y/N) 18:48

Servo unit Spindle unit Power unit AUX unit Synchro error **Alarm his clr** Next axis

(4) Press the [Y] key.



The alarm history data for the selected axis (device) is cleared to zero.

	X1	Y1	Z1	C1
Alarm hist 1:Time	1	0	0	0
1:Alarm	12	00	00	00
2:Time	2	0	0	0
2:Alarm	23	00	00	00
3:Time	1	0	0	0
3:Alarm	34	00	00	00
4:Time	2	0	0	0
4:Alarm	45	00	00	00
5:Time	0	0	0	0
5:Alarm	00	00	00	00
6:Time	0	0	0	0
6:Alarm	00	00	00	00
7:Time	0	0	0	0
7:Alarm	00	00	00	00
8:Time	0	0	0	0
8:Alarm	00	00	00	00
Maint hist 1				

\$1.00 \$2.00 18:48

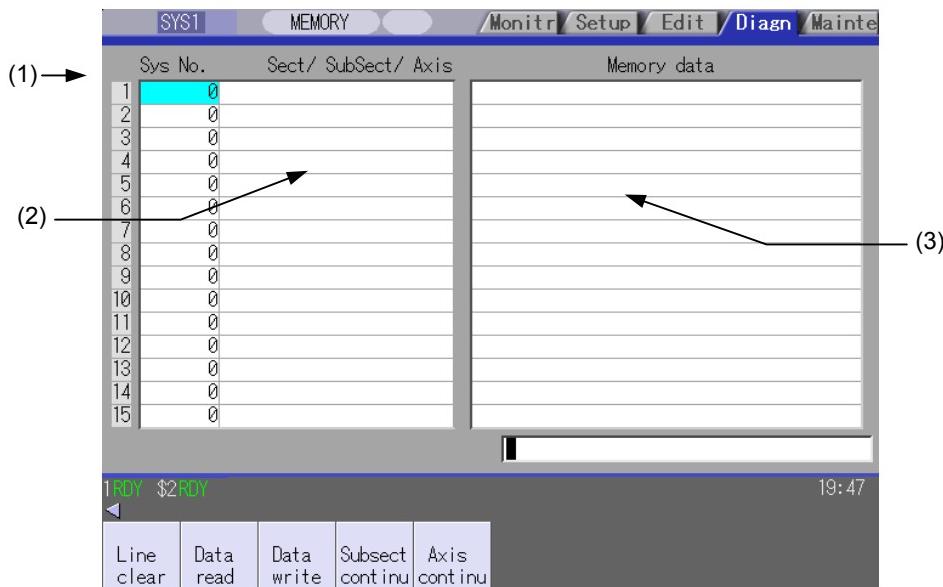
Servo unit Spindle unit Power unit AUX unit Synchro error **Alarm his clr** Next axis

5. Diagnosis Screens

5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

The NC internal data can be displayed and rewritten on the screen. The custom API library's NC data read/write interface is used to display and rewrite the NC's internal data. The contents of the NC data can be displayed by designating the part system No., section No., sub-section No. and axis No. on this screen.



Display items

Display item	Details
(1) Index No.	This displays the registration No. of the NC memory data. When one of the "2. Data contents" is set, the number is highlighted indicating that the normal display of the data contents has stopped.
(2) Data contents	<p>Part system No.: Designate the part system No. Designate "0" to designate the data common for the part systems.</p> <p>Section/sub-section/axis: Designate the section No., sub-section No. and axis No. of the data to be set and displayed. The setting format is, section No./sub-section No./axis No.</p> <p>(Note) The axis No. "1" is handled as the first axis. Designate "0" for the data which does not require an axis designation.</p>
(3) Memory data	This displays the contents of the data.

5. Diagnosis Screens

5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

Menus

Menu	Details	Type	Reference
Line clear	This erases the information in the line where the cursor is. (One entire line becomes blank.) The cursor does not move at this time.	C	
Data read	The contents of the set address data (Part system No, Section/sub-section/axis) for all the lines are constantly displayed. The Index No. highlight (indicating data is being set) is released. The cursor appears in "Part system No" of that line.	C	5.5.1 Writing/Reading the Data Using the NC Data Designation
Data write	This writes the data (Note) in the setting area to the NC memory indicated by address data at the cursor position. The Data No. highlight (indicating data is being set) is released, and constant display is started. After writing, the cursor moves to "Part system No" of the next line.	A	
Subsect continu	Based on the data of the address data where the cursor is, this displays the continuous data to which the sub-section No. has been added to the address data from the line where the cursor is. The cursor moves to "Part system No" of that line.	C	
Axis continu	Based on the data of the address data where the cursor is, this displays the continuous data to which the axis No. has been added to the address data from the line where the cursor is. The cursor moves to "Part system No" of that line.	C	

(Note) Decimal, hexadecimal, floating point data and character string data writing is possible.

Note that hexadecimal, floating point data and character strings may not be settable depending on the data.

Decimal : Integers without decimal points (Example) -1234

Hexadecimal : An "H" is necessary at the end (Example) 1234H

Floating point data : Data with a decimal point..... (Example) -12.3

Character string data : Character string (Example) X

5. Diagnosis Screens

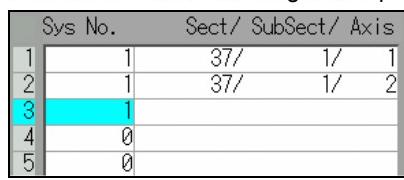
5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

5.5.1 Writing/Reading the Data Using the NC Data Designation

When reading the Process parameter "#8007 Auto corner override", the following data is set.

(Example) Part system No. : 1
Section No. : 126
Sub-section No. : 8007
Axis name : 0

Setting the data

- (1) Using the menu cursor keys, move the cursor to the "Part system No." position. → The cursor moves to the "Part system No." position.
- (2) Set the part system No.
1 → The index No. is highlighted, and the set value is displayed. The cursor moves to the right item position.


Sys No.	Sect/ SubSect/ Axis
1	37/ 1/ 1
2	37/ 1/ 2
3	1
4	0
5	0
- (3) Separate the section No., sub-section No., axis No. with a "/", and set.
126/8007/0 → The set value appears. The cursor moves to the right item position.
- (4) Press the menu key .
- (5) Set the data, and press the key. → Write processing is executed. The Index No. highlight returns to normal.

Reading the data

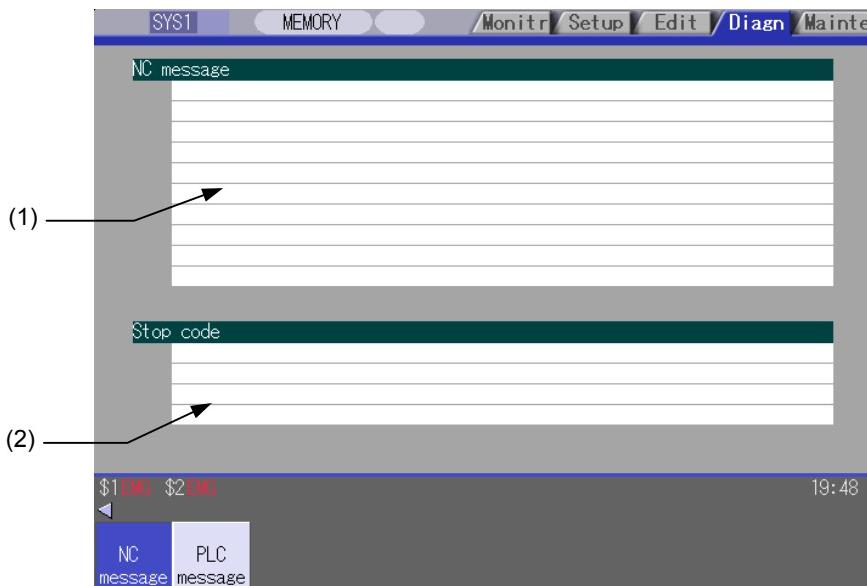
- (1) Set the part system No., section No., sub-section No., axis No. in the same way as step "Setting the data".
- (2) Press the menu key . → The index No. highlight is released, and the normal display of the memory data starts.
The data format (data size, display format) of the data displayed in the memory data differs according to the data type to be displayed.

(Note) The cursor is constantly displayed. Using the cursor keys, the cursor can be moved to the part system No. area, section/sub-section/axis area.

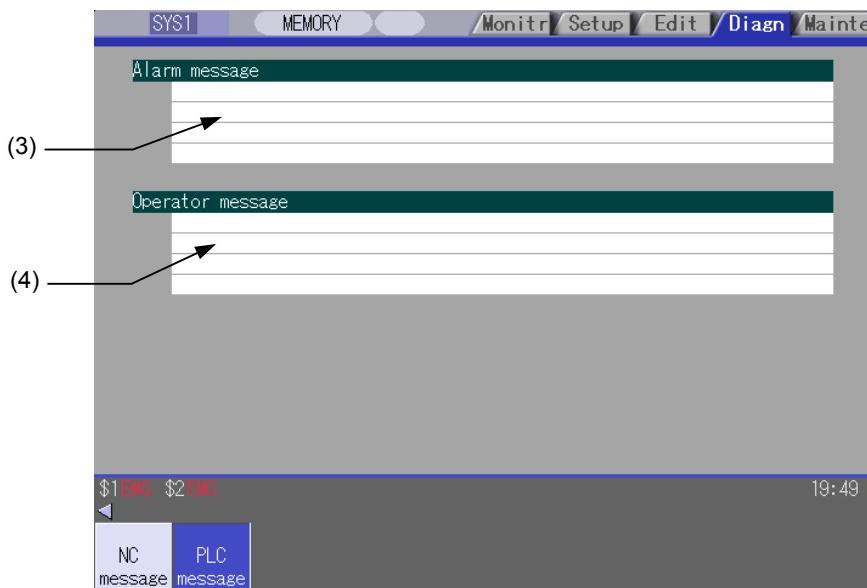
5.6 Alarm Screen

A list of currently occurring alarms or messages can be displayed on this screen. The displayed messages include the NC alarms, stop codes, alarm messages, operator messages, etc.

■ NC message



■ PLC message



Display items

Display item	Details
(1) NC alarm	This displays the operation alarms, program errors, MCP alarms, servo alarms, system alarms, etc. Up to 10 messages are displayed in order of priority.
(2) Stop code	This displays the automatic operation status or stop status during automatic operation. Up to 4 messages are displayed in order of priority.
(3) Alarm message	Using the PLC programs, this displays messages such as details of machine abnormalities. Up to 4 messages are displayed.
(4) Operator message	Using the PLC programs, this displays operator information messages. Macro alarm messages are also displayed in this field. Up to 4 messages are displayed.

Message display colors

The messages are color-coded in the following manner.

Message type	Character color	Background color
NC message	Alarm	White
	Warning	Black
Stop code	Black	Yellow
Alarm message	White	Red
Operator message	Black	Yellow

Axis name display

The axis name is displayed in messages for each axis. The axis name is displayed as shown below according to the axis type.

Axis type	Axis name display	Display example	Remarks
NC axis	Control axis name (Name of axis in part system)	XYZ	If the same message occurs for each part system, several NC axes are displayed together.
Spindle	'S' + spindle No.	S1S2	If the same message occurs, several spindles are displayed together.
PLC axis	'P' + PLC axis No.	P1P2	If the same message occurs, several PLC axes are displayed together.
Auxiliary axis	'A' + auxiliary axis No.	A1A2	If the same message occurs, several auxiliary axes are displayed together.

If the same message occurs for different axis types, they will appear as separate messages.

Part system display

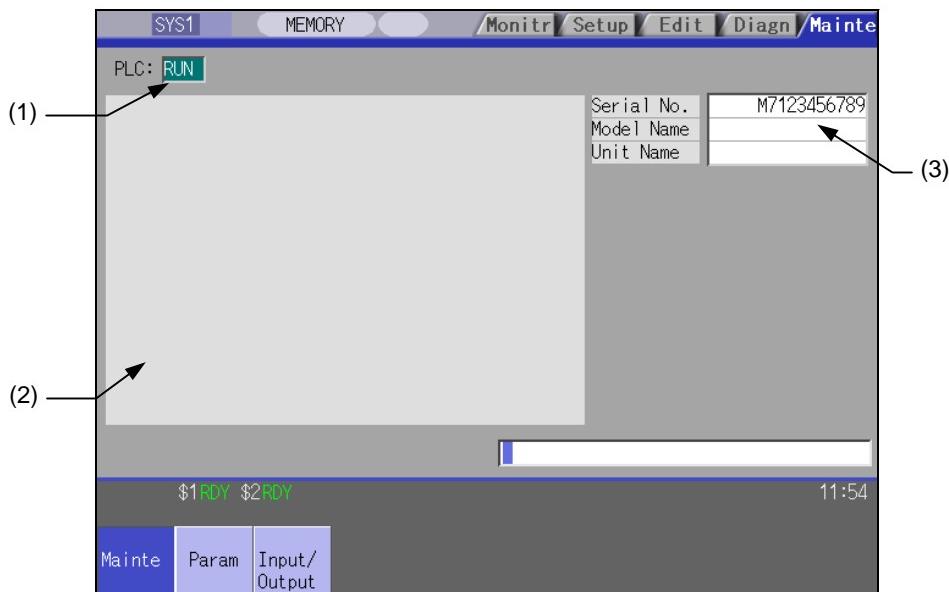
The part system name is also displayed if the message is output for each part system. The part system name set in "#1169 system name" is displayed. The part system name does not appear for the 1-part system.

Maintenance Screen

6. Maintenance Screens

6. Maintenance Screens

The NC memory can be formatted, the absolute position parameters setting, the SRAM backup, etc. are possible on this screen. Important operations are protected with a password.



Display items

Display item	Details
(1) PLC stop state	The PLC state (stopped/stop canceled) is displayed. Stopped : "STOP" is highlighted. Stop canceled : "STOP" is not highlighted.
(2) Explanation of menu operations	A brief explanation of the menu operations is displayed.
(3) Serial No.	Currently set NC information (serial No., model name and unit name) is displayed.

6. Maintenance Screens

Menus

Menu	Details	Type	Reference
Psswd input	This changes the screen related to the maintenance by setting the password.	A	
PLC stop	This forcible stops the PLC ladder process. If this menu key is pressed in the stopped state, the stop is canceled.	C	
All backup	This backs up (saves) or restores (reloads) the file such as SRAM etc. to designated device.	C	
System setup	This automatically executes necessary parameter setting for driving servomotor only by setting necessary minimum item.	C	
Adjust S-ana	This changes the screen to that for adjusting the spindle analog output.	C	
To Abs pos	This sets the absolute position for servo axis (arbitrary NC axis, PLC axis).	C	
AUX test	This carries out absolute position setting or test operation by the auxiliary axis forward run/reverse run.	C	
Collect set	This executes the followings. Setting to collect the diagnosis data Confirming the diagnosis data collection status Starting/Stopping to collect the diagnosis data Clearing the diagnosis data	C	
Option setting	This sets the options.	C	
Format	This formats the NC memory.	B	
T-life format	This formats the tool life management data.	B	
Serial No.Set	This changes the NC serial No.	A	
Console exec	The console is executed. The MS-DOS window will appear.	C	
To In/out	This changes the screen to the Data Input/Output screen.	C	
To param	This changes the screen to the Parameter screen.	C	
SRAM backup	This backs up the NC SRAM information on the HD.	B	
HMI Quit	This quits the screen operation.	B	

Backing up the NC SRAM information

(1) Press the menu **SRAM backup**. → A message appears to confirm the backup execution.

(2) Press **Y** or **INPUT**. → The backup is executed.
The data is backed up into "D:\NCFILE\SRAM.BIN" on the HD.
(If SRAM.BIN already exists, the original file will be saved as SRAM.BAK.)

Press a key other than **Y** or **INPUT** to cancel the backup.

6. Maintenance Screens

6.1 Parameter Screens

6.1 Parameter Screens

The various parameters can be displayed and set on this screen.

The configuration of the all parameter screens is applied to one of the following five patterns.

<Pattern 1> This is the screen for setting the common parameters for the axis, device, etc.
(Process param, etc.)

No.		Name		Data		No.		Name		Data	
		<WRK COUNT>						<FIXED C.>			
8001		WRK COUNT M		30		8012		G73 n		0.000	
8002		WRK COUNT		44		8013		G83 n		0.000	
8003		WRK COUNT LIMIT		333		8014		CDZ-VALE		0	
		<AUTO TLM>				8015		CDZ-ANGLE		0	
8004		SPEED		0		8016		G71 MINIMUM		0.000	
8005		ZONE r		0.000		8017		G71 DELTA-D		0.000	
8006		ZONE d		0.000		8018		G84/G74 n		0.000	
		<AUTO CORNER OVR.>				8019		R. COMP		0	
8007		OVERRIDE		0		8020		Theor R decrease		2.296	
8008		MAX. ANGLE		0		8021		DCC. ANGLE		0	
8009		DSC. ZONE		0.000		8022		COMP_CHANGE		0	
		<XT-TIP OFFSET>				8023		CORNER COMP		0	
8010		ABS. MAX		0.000		8024		CURVE COMP		0	
8011		INC. MAX		0.000							

\$1 RDY \$2 RDY 20:37

Process param Ctrl param Axis param Operate param Area copy Area paste

<Pattern 2> This is the screen for setting the parameters having an array structure for each axis
(Axis param, etc.)

No.	Name	X1	Y1	Z1	C1
8201	AX. RELEASE	0	0	0	0
8202	OT-CHECK OFF	1	1	1	1
8203	OT-CHECK-CANCEL	0	0	0	0
8204	OT-	1.000	1.000	1.000	1.000
8205	OT+	1.000	1.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000	0.000
8207	G76/87 IGNR	0	0	0	0
8208	G76/87 (-)	0	0	0	0
8209	G60 SHIFT	0.000	0.000	0.000	0.000
8210	OT INSIDE	0	0	0	0
8211	MIRR. IMAGE	0	0	0	0
8212					
8213	Rotation axis type	0	0	0	0

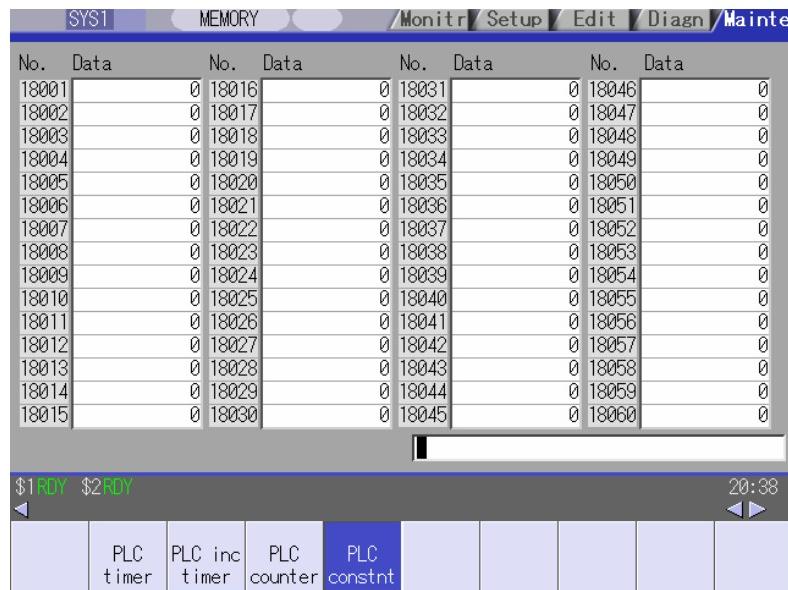
\$1 RDY \$2 RDY 20:37

Process param Ctrl param Axis param Operate param Area copy Area paste Next axis

6. Maintenance Screens

6.1 Parameter Screens

<Pattern 3> This is the screen for setting parameters common for the axis and device, etc.
The parameter names are not displayed
(Machine error data, PLC constant, etc.)

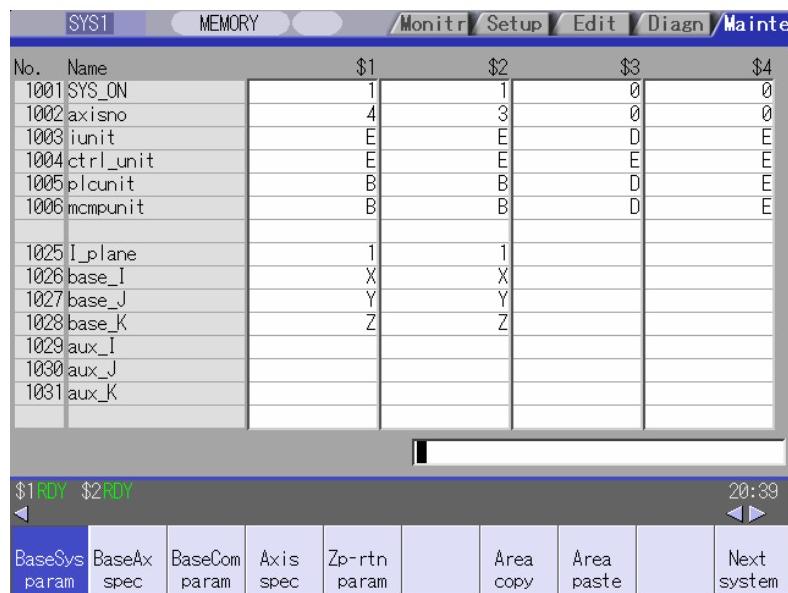


No.	Data	No.	Data	No.	Data	No.	Data
18001	0	18016	0	18031	0	18046	0
18002	0	18017	0	18032	0	18047	0
18003	0	18018	0	18033	0	18048	0
18004	0	18019	0	18034	0	18049	0
18005	0	18020	0	18035	0	18050	0
18006	0	18021	0	18036	0	18051	0
18007	0	18022	0	18037	0	18052	0
18008	0	18023	0	18038	0	18053	0
18009	0	18024	0	18039	0	18054	0
18010	0	18025	0	18040	0	18055	0
18011	0	18026	0	18041	0	18056	0
18012	0	18027	0	18042	0	18057	0
18013	0	18028	0	18043	0	18058	0
18014	0	18029	0	18044	0	18059	0
18015	0	18030	0	18045	0	18060	0

\$1RDY \$2RDY 20:38

PLC timer PLC inc timer PLC counter PLC constnt

<Pattern 4> This is the screen for setting parameters having an array structure for each part system
(Base system parameters, etc.)



No.	Name	\$1	\$2	\$3	\$4
1001	SYS_ON	1	1	0	0
1002	axisno	4	3	0	0
1003	iunit	E	E	D	E
1004	ctrl_unit	E	E	E	E
1005	plcunit	B	B	D	E
1006	mcpunit	B	B	D	E
1025	I_plane	1	1		
1026	base_I	X	X		
1027	base_J	Y	Y		
1028	base_K	Z	Z		
1029	aux_I				
1030	aux_J				
1031	aux_K				

\$1RDY \$2RDY 20:39

BaseSys param BaseAx spec BaseCom param Axis spec Zp-rtn param Area copy Area paste Next system

Menus

Menu	Details	Type	Reference
Param No.	A arbitrary parameter No. can be selected. When the parameter No. is set and the INPUT key is pressed, the parameters will appear with that No. at the head. The cursor will also move to that No.	A	6.1.2 Selecting the Parameter No.
Area copy	This copies the parameter setting values in the designated range. The range is designated with numbers.	A	6.1.4 Copying/Pasting Parameters
Area paste	This pastes the range of parameters designated in area copy. They are pasted in a parameter corresponding to the axis or part system where the cursor is. Once copied, a parameter can be pasted any number of times until a new parameter is copied.	B	
Next axis	This can be selected when there are five or more display axes in the selected part system. This is used in the screen for the parameters having an array structure for each axis.	C	-
Next system	This can be selected when there are two or more screen display part systems. Use this with the parameter screen for each parameter. This can always be selected when the base part system parameter screen is open. The display changes to the PLC axis display when this menu is pressed.	C	6.1.6 Machine Parameters
Process param	This changes the screen to the user parameter screen. (Note) The barrier data is displayed only for the L specifications.	C	6.1.5 User Parameters
Control param			
Axis param			
Operate param			
Barrier data			
I/O param			
Ethernet param			
Link param			
Subpro stor			

6. Maintenance Screens

6.1 Parameter Screens

Menu	Details	Type	Reference
BaseSys param	This changes the screen to the Machine parameter screen. (Note 1) Normally, the machine parameters can be referred to, but cannot be set.	C	6.1.6 Machine Parameters
BaseAx spec	(Note 2) This menu displays when the rotary axis parameter, auxiliary axis parameter, and open parameter 1/2 are enabled.		
BaseCom param			
Axis spec			
Zp-rtn param			
Abs pos param			
Servo param			
Spindle spec			
Spindle param			
RotAxis param			
PLC timer			
PLC inc timer			
PLC counter			
PLC constnt			
Bit select			
Er Comp param			
Er Comp data			
Macro list			
Posn switch			
AUX param			
Open param1			
Open param2			

6.1.1 Changing the Parameter Display

Changing to the computer link parameters

(1) Press the menu change key until the menu **Link param** appears.

(2) Press the menu **Link param**.

The menu **Link param** appears.

The computer link parameters appears.
The menu **Link param** is highlighted.

No.	Name	Data	No.	Name	Data
9601	BAUD RATE	0	9616	CTRL. INTERVAL	0
9602	STOP BIT	0	9617	WAIT TIME	0
9603	PARTY EFFECTIVE	0	9618	PACKET LENGTH	0
9604	EVEN PARITY	0	9619	BUFFER SIZE	0
9605	CHR. LENGTH	0	9620	START SIZE	0
9606	HAND SHAKE	0	9621	DC1 OUT SIZE	0
9607	TIME-OUT SET	0	9622	POLLING TIMER	0
9608	DATA CODE	0	9623	TRANS. WAIT TMR	0
9609	LINK PARAM. 1	00	9624	RETRY COUNTER	0
9610	LINK PARAM. 2	00	9625		
9611	LINK PARAM. 3	00	9626		
9612	LINK PARAM. 4	00	9627		
9613	LINK PARAM. 5	00	9628		
9614	START CODE	0	9629		
9615	CTRL. CODE OUT	00	9630		

\$1 RDY \$2 RDY 20:41

I/O param	Ethernet param	Link param	Subprocessor		Area copy	Area paste
-----------	----------------	-------------------	--------------	--	-----------	------------

6.1.2 Setting the Parameters

The method of setting the parameters is explained in this section. For the setting range of each parameter, Press the menu key to select the parameter screen, and select the data to be set with the cursor key.

"8201 Axis removal" Setting Y1 axis to "1"

(1) Press the menu **Axis param**.

(2) Use the **↓**, **↑**, **←** and **→** keys to move the cursor to the position to be set.

The cursor can also be moved with the menu **Param No.**.

Refer to "6.2.2 Selecting the parameter No.".

The cursor moves to the position of the setting target data.

No.	Name	X1	Y1
8201	AX. RELEASE	0	0
8202	OT-CHECK OFF	1	1
8203	OT-CHECK-CANCEL	0	0
8204	OT-	1.000	1.000
8205	OT+	1.000	1.000
8206	TOOL CHG.P	0.000	0.000

The current setting value is displayed in the input area.

(3) Input the value.

1 INPUT

The setting value appears, and the cursor moves.

No.	Name	X1	Y1
8201	AX. RELEASE	0	1
8202	OT-CHECK OFF	1	1
8203	OT-CHECK-CANCEL	0	0
8204	OT-	1.000	1.000
8205	OT+	1.000	1.000
8206	TOOL CHG.P	0.000	0.000

"8205 OT+" Setting X1 axis to "100.0" and Z1 axis to "200.0"

(1) Press the menu [Axis param].

(2) Use the and keys to move the cursor to the position to be set.
(The row does not need to be designated with the and keys.)



The cursor moves to the position of the setting target data.

No.	Name	X1	Y1	Z1
8201	AX. RELEASE	0	1	0
8202	OT-CHECK OFF	1	1	1
8203	OT-CHECK-CANCEL	0	0	0
8204	OT-	1.000	1.000	1.000
8205	OT+	1.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000

The current setting value is displayed in the input area.

(3) Input the value.
(Format: 1st row/2nd row/3rd row/4th row)
100/200 [INPUT]



The setting value appears, and the cursor moves.

No.	Name	X1	Y1	Z1
8201	AX. RELEASE	0	1	0
8202	OT-CHECK OFF	1	1	1
8203	OT-CHECK-CANCEL	0	0	0
8204	OT-	1.000	1.000	1.000
8205	OT+	100.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000

- (Note 1) If [PR] appears at the lower right of the screen when the parameter value is changed, the parameter value will be validated when the power is turned ON again.
- (Note 2) If the [INPUT] key is pressed without inputting a value, the cursor will move without changing the parameter setting value.
- (Note 3) If a character string, such as an axis name or input/output device name, is set in the parameter, the setting will be cleared when 0 is input and the [INPUT] key is pressed.
- (Note 4) Parameters for up to four rows, which are as currently displayed, can be set at once.
- (Note 5) If the parameter value for several rows is input simultaneously, the values will be set from the currently displayed left end no matter which row the cursor is currently at.

6.1.3 Copying/Pasting Parameters

Designating the cursor position and copying

(1) Move the cursor to the parameter to be copied.

(2) Press the menu [Area copy] and [INPUT].

The menu is highlighted.
The setting value of the parameter at the cursor position highlighted.

No.	Name	X1
8201	AX. RELEASE	0
8202	OT-CHECK OFF	1
8203	OT-CHECK-CANCEL	0
8204	OT-	1.000
8205	OT+	100.000
8206	TOOL CHG.P	0.000

(Note) When the screen has an array structure for each axis or each part system, an error will occur if different rows (axis or part system) are designated for the copy start position and end position.

Copying by designating the parameter No. with key inputs

(1) Move the cursor to the display area of the axes or part system to be copied.

(2) Press the menu [Area copy].

The menu is highlighted.

(3) Designate the copy range.
Format: First No./Last No.

8203/8205 [INPUT]

The copy target range is highlighted.
The menu highlight returns to normal.

No.	Name	X1
8201	AX. RELEASE	0
8202	OT-CHECK OFF	1
8203	OT-CHECK-CANCEL	0
8204	OT-	1.000
8205	OT+	100.000
8206	TOOL CHG.P	0.000

If the last No. to be copied is the last No. of the currently displayed parameter type, "E" can be designated. **(Example)** 8201/E
If only one parameter is being copied, input only the No. of the parameter to copy, and then press the [INPUT] key.

Pasting the copied data

(1) Move the cursor to the display area of the axes or part system where the data will be pasted.

(2) Press the menu key [Area paste].

The menu is highlighted, and a message confirming the operation appears.

(3) Press [Y] or [INPUT].

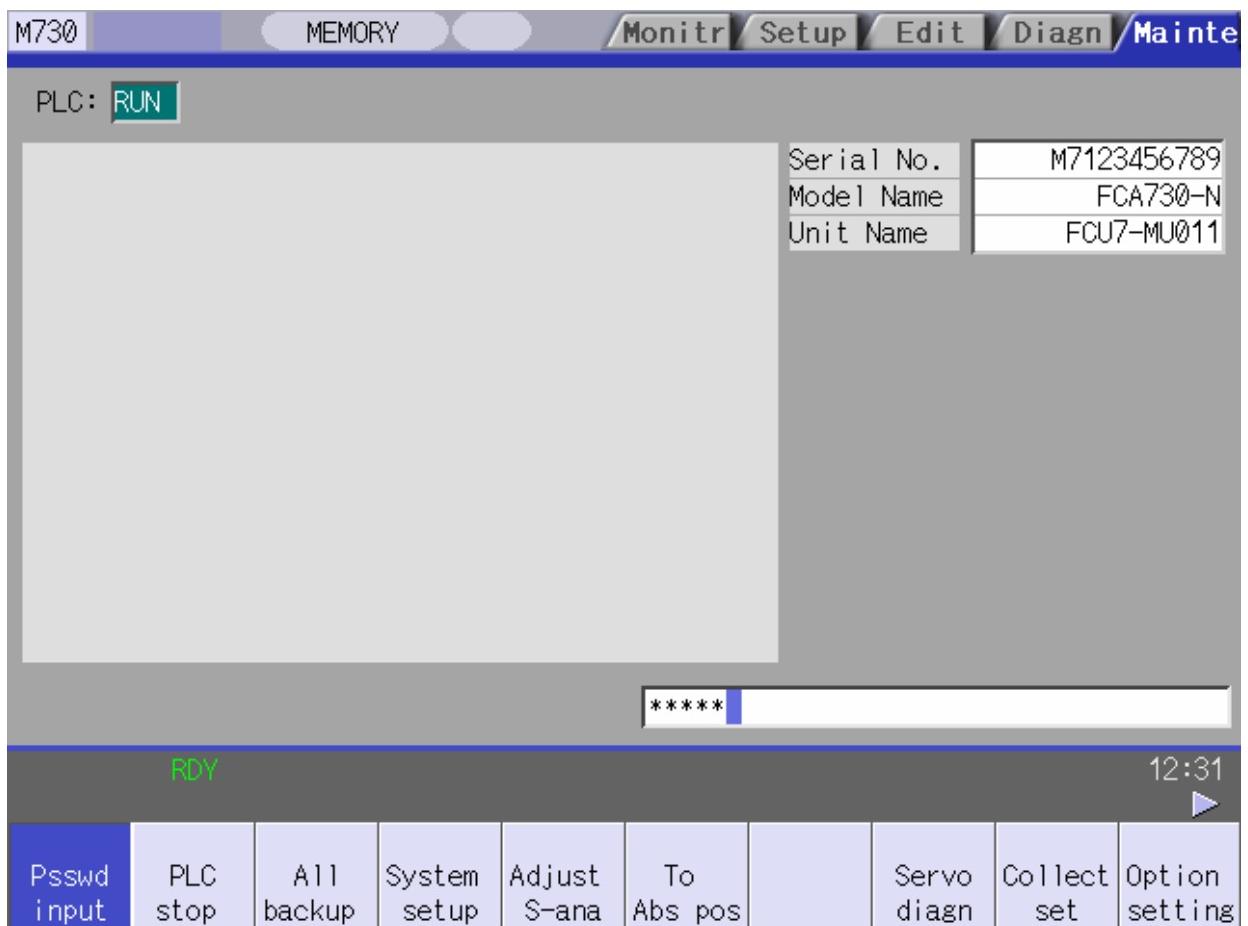
The copied data is written to the parameter with the same number as when copied, in the area where the cursor is. The menu highlight returns to normal.

The copied data will not be written in when the [N] key is pressed.

6.1.4 How to Setup Machine Parameter

Operation method

- (1) Press [Mainte] menu key.
- (2) Press [Psswd input] and input "MPARA" password for setup or modify machine parameter.



For Example : Language screen display selection

- (1) Press [Psswd input] and input "MPARA" password for setup or modify machine parameter.

6. Maintenance Screens

6.1 Parameter Screens

- (2) Press **BaseCom param**

The screenshot shows the M730 parameter screen. At the top, there are tabs: M730, MEMORY, Monitr, Setup, Edit, Diagn, and Mainte. The 'BaseCom param' tab is highlighted. Below the tabs is a table with two columns of parameters. The left column has parameters numbered 1038 to 1052. The right column has parameters numbered 1053 to 1083. The row for parameter #1043 lang is selected, indicated by a blue highlight. The status bar at the bottom shows 'RDY' and the time '12:36'.

No.	Name	Data	No.	Name	Data
1038	p1cse1	0	1053		
1039	spinno	1	1054		
1040	M_inch	0	1055		
1041	I_inch	0	1056		
1042	pcinch	0	1057		
1043	lang	0	1058		
1044	auxno	0	1059		
1045	nskno	0	1077	radius	0
1046			1078	Decpt2	0
1047			1079	F1dig	0
1048			1080	Dri1_Z	1
1049			1081	Gmac_P	0
1050	MemPrg	0	1082	Geomet	0
1051	MemTo1	0	1083		
1052	MemVa1	0			

- (3) move cursor down to **#1043 lang** and set the value to "0" then press any function will be English display screen.

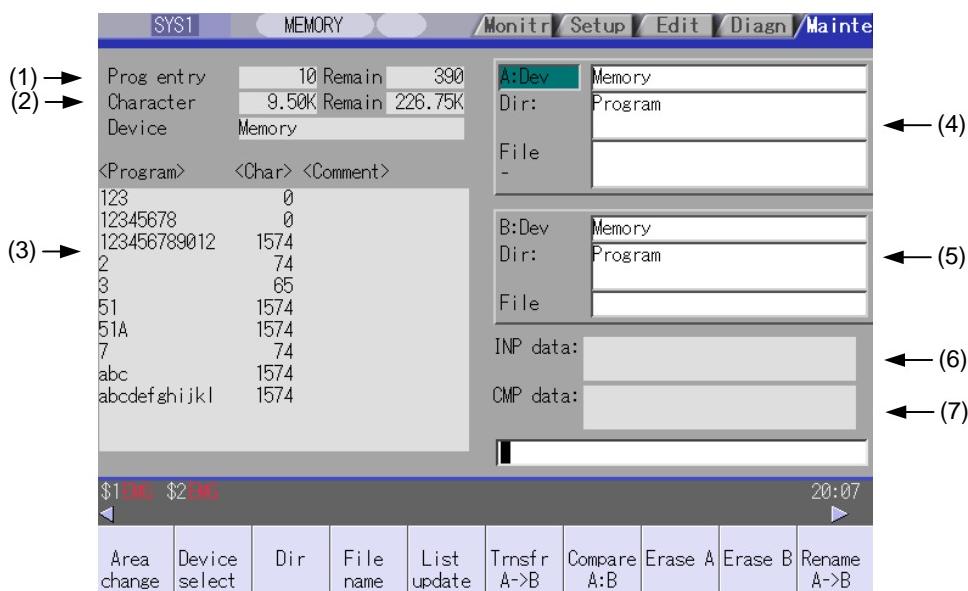
6. Maintenance Screens

6.2 Input/Output Screen

6.2 Input/Output Screen

The Input/Output screen is used to carry out NC data input/output between the NC internal memory and the external input/output devices.

Here, the hard disk built into the NC device is also treated as external devices.



Display items

Display item	Details
(1) Number of programs registered and remainder (Note 1)	This displays the registration information of machining program of the selected device. Number of programs registered : This displays the number of programs previously registered as user machining programs. Remainder : This displays the remaining number of programs that can be registered. When "Memory" is selected as the device, the total of the number of programs registered and the remainder is the maximum number of registrations set in the specifications.
(2) Number of memory characters and remainder (Note 1)	This displays the number of characters of the machining program of the selected device. Number of memory characters : This displays the number of characters previously registered as user machining programs. Remainder : This displays the remaining number of characters that can be registered. The total of the number of memory characters and the remainder is the maximum number of memory characters set in the specifications.

6. Maintenance Screens

6.2 Input/Output Screen

Display items	Details
(3) List (Note 2)	<p>This displays a contents list (directory and file name) of the directory in the setting column (file setting column A or B) where the cursor is currently located.</p> <p>Program :</p> <p>When "Memory" is selected for the device, this displays the file name (program No.) of the machining programs already registered. The file names are displayed in order from the smallest number, from 1 to 99999999. When a device other than memory is selected, this displays the file name and directory to be included in the directory that is set in the current setting column.</p> <p>When the number of characters exceeds 12, the excess is indicated as "*".</p> <p>Character :</p> <p>The size of each file (when memory is selected for the device, the number of characters in the machining program). When directory is selected, this displays "DIR".</p> <p>Comment :</p> <p>This displays the comment (up to 17 alphanumeric characters and symbols) of each file.</p> <p>The date which the file is updated is displayed for the HD, FLD, memory card, DS or Ethernet.</p> <p>When the number of characters exceeds 17, the excess is not displayed.</p>
(4) File setting column A	
(5) File setting column B	
(6) Input data	This displays the data being transferred.
(7) Comparison data	This displays the data being compared. If an error occurs during comparison, the block with the error is displayed.

(Note 1) Depending on the device, some items are not displayed.

Display item	Device	Memory	HD	Serial	Memory card	DS	Ethernet	FLD
Number of programs registered								
Remainder								
Number of memory characters							*	
Remainder								
List								

○ : Displayed × : Not displayed

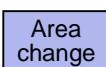
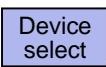
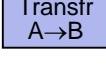
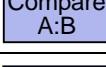
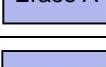
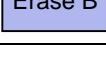
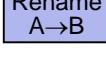
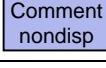
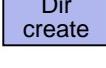
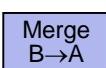
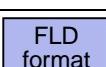
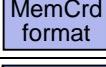
* : When the Ethernet parameter "#97*1 Host n no total siz" is set to 1, the number of host memory characters will not appear.

(Note 2) The list does not appear when using serial.

6. Maintenance Screens

6.2 Input/Output Screen

Menus

Menu	Details	Type	Reference
 Area change	This changes the setting area to file setting column A (transfer origin) or file setting column B (transfer destination). The display of the valid area (A or B) is highlighted.	C	6.2.1 Changing the Valid Area
 Device select	This displays the submenu of the machining program storage area. When the submenu is selected, the device is confirmed, and if a directory exists it is set in the root. The memory is selected as the default.	A	6.2.2 Selecting a Device, Directory, and File
 Dir	This menu sets the directory that carries out input/ output operations, and is on standby for input. Note that when memory is selected for the device, the directory can be selected from the submenu.	A	
 File name	This menu sets the file name that carries out input/ output operations, and is on standby for input. When memory is selected for the device, setting is not necessary if the directory is not the program.	A	
 List update	This updates the list. The list of the directly selected in the currently valid file setting column (A/B) is updated.	C	-
 Transfr A→B	This copies the file in file setting column A (transfer origin) to the file setting column B (transfer destination). (The transfer origin file is not changed.) A message appears during transfer and when the transfer is completed.	B	6.2.3 Transferring a File
 Compare A:B	This compares the files in file setting column A (transfer origin) and file setting column B (transfer destination).	C	6.2.4 Comparing Files (Compare)
 Erase A	This erases the file in file setting column A. (Note) The NC memory (excluding programs), serial and Ethernet (host file) cannot be erased.	B	6.2.5 Erasing a File
 Erase B	This erases the file in file setting column B. (Note) The NC memory (excluding programs), serial and Ethernet (host file) cannot be erased.	B	
 Rename A→B	This changes the name of the file in file setting column A (transfer origin) to the name of the file in file setting column B (transfer destination). (Note) The same device must be selected for A and B. The NC memory (excluding programs) and serial cannot be renamed.	B	6.2.6 Changing a File Name
 Comment nondisp	This changes whether to show or hide the comment field.	B	
 Dir create	This creates a new directory in the directory of the currently valid file setting column (A/B). The directory can be created when HD, FLD, memory card or DS is selected for the device.	A	6.2.7 Creating a Directory
 Merge B→A	The file contents in the file setting column B are added to the file in the file setting column A. (The file in the file setting column B is not changed.) (Note) The NC memory (excluding programs), serial and Ethernet (host file) cannot be merged.	B	6.2.8 Merging a File
 FLD format	This formats the FLD.	A	
 MemCrd format	The formats the front IC card.	A	
 DS format	This formats the NC compact flash memory.	A	
 Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	-

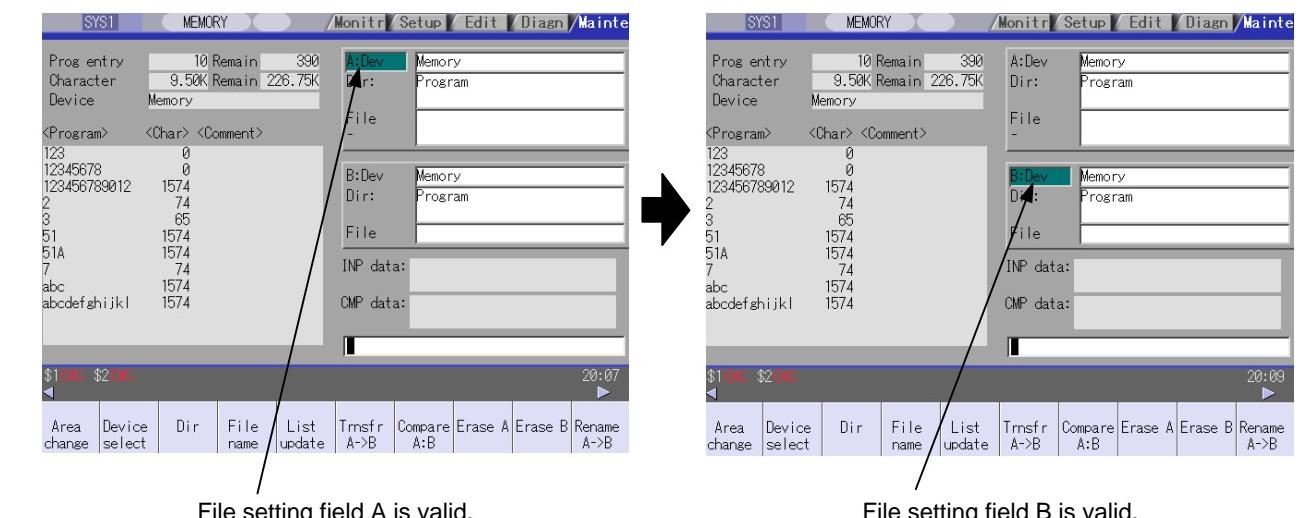
6. Maintenance Screens

6.2 Input/Output Screen

6.2.1 Changing the Valid Area

When setting the file setting field A or B device, directory and file name on this screen, the area containing these must be valid.

The display area can be changed by pressing the menu key (Area change) or the cursor key and .



Changing the valid file setting field

When file setting field A (top) is valid

- (1) Press the menu [Area change].

This can also be changed with the cursor key .

The file setting field B (bottom) is validated.

6.2.2 Selecting a Device, Directory and File

File selection sequence

Designate the device where the target file is located.	Select from the sub menu.
Designate the directory with a full path.	Input the full path or select from the list.
Designate the file name.	Input the file name or select from the list.

Menu used

Device select menu's submenus

Menu	Details	Type	Reference
Memory	This selects the NC memory (program, parameter, user PLC, NC data).	C	-
HD	This selects the hard disk.	C	-
Serial	This selects the RS-232C device (PC, tape, etc.).	C	-
Memory card	This selects the front IC card.	C	-
DS	This selects the NC compact flash memory.	C	-
Ethernet	This selects the Ethernet-connected host computer.	C	-
FLD	This selects the floppy disk.	C	-

Dir (other than memory) and File name menu submenus

Menu	Details	Type	Reference
From list	The cursor appears in the list display. The list contents can be selected with the INPUT key. When a directory is selected, the contents of the selected directory are displayed in the list. Continued selection is possible. When a file name is selected, the file name is temporarily displayed in the input area. When the INPUT key is pressed again, it is fixed.	A	-

6. Maintenance Screens

6.2 Input/Output Screen

Selecting an NC memory program

(1) Press the menu [Device select].



(2) Press the menu [Memory].

A:Dev	Memory
Dir:	Program
File	-

(3) Press the menu [File name].

From
list

<When inputting the file name from the input area>

(4) Input the file name
10013 [INPUT]

A:Dev	Memory
Dir:	Program
File	10013

<When selecting the file name from the list>

(4)-1 Press the menu [From list].

<Program>	<Char>	<Comment>
101	73	MAIN
102	53	SUB1
103	54	SUB2
10011	519	
10012	139	
10013	100	

(4)-2 Move the cursor to file name to be selected, and fix.

[↑], [↓], [INPUT]

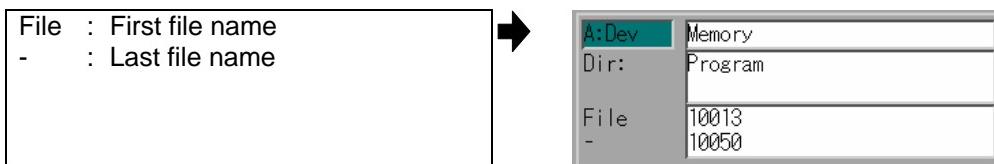
10013

(4)-3 Press the [INPUT] key.

A:Dev	Memory
Dir:	Program
File	10013

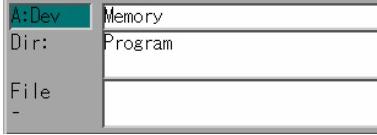
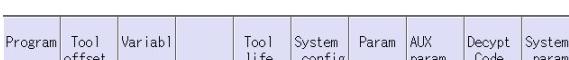
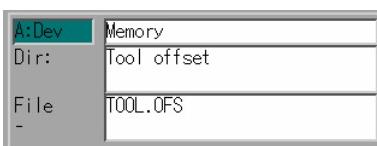
Designating multiple files**(1) Designating multiple serial files**

Multiple serial files can be transferred, compared and erased in the file setting column A. Set as follows in this case.

**(2) Using a wild card**

A wild card (*) can be used in the file name.

**Selecting an NC memory file other than a program**

- (1) Press the menu [Device select]. → 
- (2) Press the menu [Memory]. → 
- (3) Select the menu [Dir]. → 
- (4) Press the menu [Tool offset]. → 

(Note) The file name for each directory is fixed. Refer to "6.2.10 List of file names" for the file names.

6. Maintenance Screens

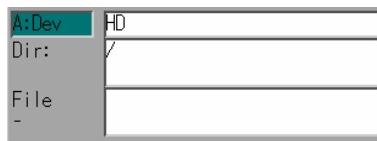
6.2 Input/Output Screen

Selecting a device file other than the NC memory

(1) Press the menu [Device select].



(2) Select a device.

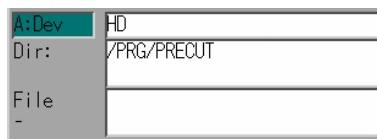


(3) Designate the directory.
Select the menu [Dir]



<When inputting the directory from the input area>

(4) Input the directory path as a full path.
/PRG/PRECUT



<When selecting the directory from the list >

(4)-1 Press the menu [From list]

<Program>	<Char>	<Comment>
.		DIR
..		DIR
NCDATA		DIR
PRG		DIR

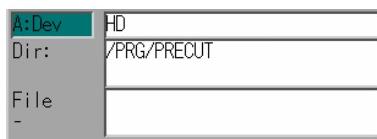
(4)-2 Move the cursor to directory to be selected, and fix.



Repeat this operation until the target directory is reached.

When the target directory is reached,

press the key and quit the mode for inputting the directory.



6. Maintenance Screens

6.2 Input/Output Screen

(5) Designate the file name.
Press the menu [File name]

From
list

<When inputting the file name from the input area>

(6) Input the file name
10013.PRG

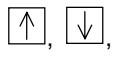
A:Dev	HD
Dir:	/PRG/PRECUT
File	10013.PRG
-	

<When selecting the file name from the list>

(6)-1 Press the menu [From list].

<Program>	<Char>	<Comment>
.	DIR	
..	DIR	
10011.PRG	521	Oct 02 13:18 2002
10012.PRG	141	Oct 02 13:19 2002
10013.PRG	102	Oct 02 13:19 2002
10014.PRG	163	Oct 02 13:20 2002
10015.PRG	90	Oct 02 13:21 2002

(6)-2 Move the cursor to file name to be selected, and fix.



|10013.PRG|

(6)-3 Press the [INPUT] key.

A:Dev	HD
Dir:	/PRG/PRECUT
File	10013.PRG
-	

Cancelling the input mode

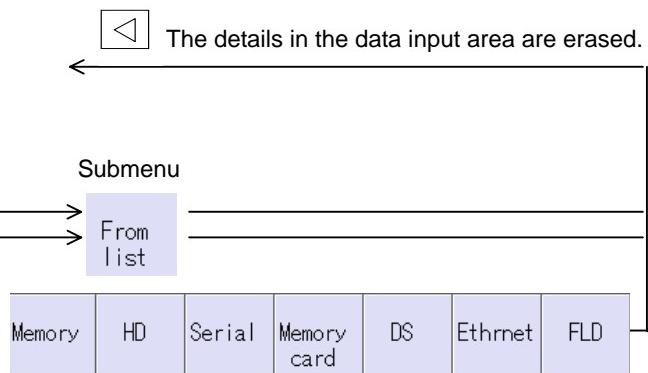
- (1) Press the **Device Select**, **Dir** or **File name**. → The submenu appears.

To cancel the data input at this time, press the key.

- (2) Press the key. → The details in the input area are erased, and the main menu appears.

Main menu

Area change	Device select	Dir	File name	List update	Trnsfr A->B
-------------	---------------	-----	-----------	-------------	-------------



6.2.3 Transferring a File

Operating method

- (1) Press the menu **[Area change]**, and select file setting column A.
- (2) Designate the transfer origin device, directory and file name. →
- (3) Press the menu **[Area change]**, and select file setting column B.
- (4) Designate the transfer destination device, directory and file name. → The designated file appears.
- (5) Press the menu **[Trnsfr A ->B]**. → A message appears to confirm the transfer.
- (6) Press **[Y]** or **[INPUT]**. →

INP data :	G91 G28 XYZ; F1000;
CMP data:	



CAUTION

" ; ", "EOB", "%", and "EOR" are symbols used for explanation. The actual codes for ISO are "CR, LF" ("LF") and "%".

The programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, however, the programs created with external devices such as the FLD or RS-232C may be stored in an "LF" format.

The actual codes for EIA are "EOB (End of Block)" and "EOR (End of Record)".



To prevent the influence of data loss and data transformation over the line, always carry out data comparison after transferring a machining program.

6.2.4 Comparing Files (Compare)

Operation method

- (1) Press the menu [Area change], and select file setting column A.
- (2) Designate the device, directory and file name to be compared. → The designated file name appears.
- (3) Press the menu [Area change], and select file setting column B.
- (4) Designate the other side device, directory and file name to be compared. → The designated file name appears.
- (5) Press the menu [Compare A:B]. →

```
INP data: (MAIN);G28XYZ;G00X10.;N1X20.  
;X30.;X40.;N2X50.;M98P102H1;  
CMP data: (MAIN);G28XYZ;G00X10.;N1X20.  
;X30.;X40.;N2X50.;M98P103H1;
```

(Note) Files that can be compared are text files only.
Correct outcome will not be obtained through binary file comparison.

6.2.5 Erasing a File

Erasing a file Erase A

- (1) Press the menu **Area change**, and select file setting column A.
- (2) Designate the device, directory and file name to be erased. → The designated file appears.
- (3) Press the menu **Erase A**. → A message to confirm the erasing appears.
- (4) Press **Y** or **INPUT**. →

(Note) If the file to be erased is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed, and the file will not be erased.

Erasing a file Erase B

The operations are the same as method "Erasing a file **Erase A**" above. Designate the target device, directory and file name in the file setting column B, and press the menu **Erase B**.

6.2.6 Changing a File Name (Rename)

Operation method

- (1) Press the menu **Area change**, and select file setting column A.
- (2) Designate the original device, directory and file name. → The designated file name appears.
- (3) Press the menu **Area change**, and select file setting column B.
- (4) Designate the new device, directory and file name. → The designated new file name appears.
- (5) Press the menu **Rename A -> B**.
- (6) Press **Y** or **INPUT**. →

(Note 1) Select the same device for original and new devices.

(Note 2) If the file to be renamed is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed, and the name will not be changed.

(Note 3) If a file that does not exist is designated for the original file, or if an existing file name is designated for the new file selection, an error occurs, and the name is not changed.

6.2.7 Creating a Directory

Operation method

- (1) Press the menu [Area change], and select file setting column A.
- (2) Designate the device. → The designated details appear.
The devices that can create a directory are HD, FLD, Memory card and DS.
- (3) Designate the directory where the new directory is to be created. → The designated details appear.
- (4) Set the new directory in file setting column A. → The designated details appear.
- (5) Press the menu [Dir create]. → The designated directory is created.

The directory can also be created in file setting area B.

(Note 1) Up to 223 files, including the directory, can be registered in the FLD's root directory.

6.2.8 Merging a File

Operation method

- (1) Press the menu [Area change], and select the file setting column A.
- (2) Designate the merge destination device, directory and file name. → The designated file name appears.
- (3) Press the menu [Area change], and select the file setting column B.
- (4) Designate the merge origin device, directory and file name. → The designated file name appears.
- (5) Press the menu [Merge B ->A]. → A message confirming the merge appears.
- (6) Press [Y] or [INPUT]. →

INP data :	G91 G28 XYZ; F1000;
CMP data :	

(FILE A) G28 XYZ; G90 F800; G00 X100. Y100.; (FILE B) G91 G28 XYZ; F1000; G01 X200. Y200.; M02; %	}
Details of file in file setting column A before merge.	

(FILE A) G28 XYZ; G90 F800; G00 X100. Y100.; (FILE B) G91 G28 XYZ; F1000; G01 X200. Y200.; M02; %	}
Details of file in file setting column B before merge.	

(Note 1) If the merge destination file (file in file setting column A) is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed, and the files will not be merged.

(Note 2) The devices that can be merged are the memory, HD, FLD, memory card and DS.

6.2.9 Formatting an External Device

Operation method (Formatting a memory card)

- (1) Press the menu [MemCrd format]. → A message confirming the formatting appears.
- (2) Press [Y] or [INPUT]. → The memory card is formatted.
A message appears when the formatting is completed.

(Note 1) The memory card and data server are formatted with FAT32.

(Note 2) The volume label is set when the memory card is formatted.

Operation method (Formatting a DS)

First, press the menu [DS format]. Refer to "Formatting a memory card" for operations.

(Note 1) Only the DS formatted with FAT or FAT32 can be used. The DS with NTFS cannot be used.

(Note 2) As for the DS formatted with NTFS, reformat it with FAT or FAT32 by Windows to use.

(NC cannot convert NTFS partition to FAT or FAT32.)

(Note 3) The volume label is not set even when the DS is formatted.

6.2.10 List of File Names

There is a directory for each type of data in the NC memory.

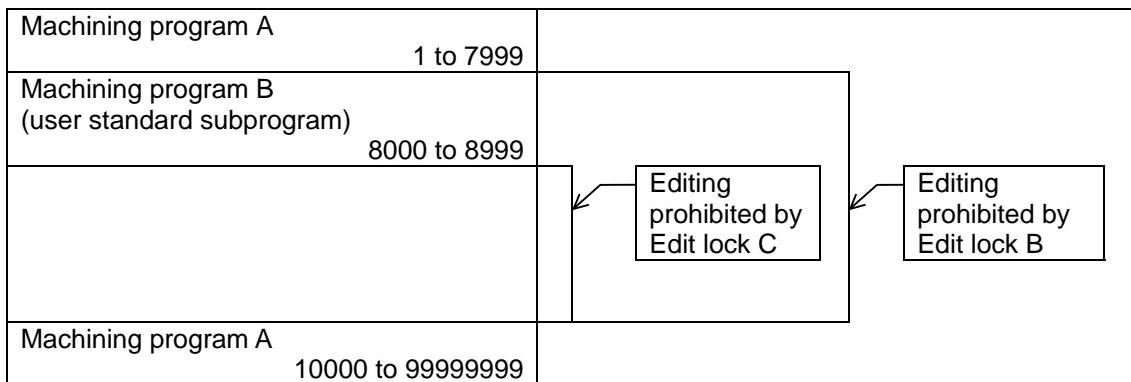
Each directory and file name (fixed) in the NC memory is shown below.

Do not change the extensions (.XXX) when storing in a device other than the NC memory.

Data type	NC memory directory path	Fixed file name
Machining program	/PRG/USER	(Program No.)
Fixed cycle program	/PRG/FIX	(Program No.)
Parameters	/PRM	
Parameters [User, machine] (Text format)		ALL.PRM
Auxiliary axis parameter		AUXAXIS.PRM
User PLC	/LAD	USERPLC.LAD
NC data	/DAT	
Tool compensation amount data		TOOL.OFS
Tool life management data		TLIFE.TLF
Common variable data		COMMON.VAR
SRAM data		SRAM.BIN
System configuration data	/DGN	ASSEMBLY.INF
Decryption code	/RLS	PASSCODE.DAT
Sampling data	/LOG	NCSAMP.CSV
Machine data	/DGN	COMPO.STA

6.2.11 Edit Lock B and C

This function prohibits editing, erasing, etc., of the machining programs B and C, and protects the machining programs in NC memory.



The operations below in the Edit MDI and the Input/Output screens are influenced by the edit lock setting. An error will result if operations that are not possible are attempted.

When the edit lock is valid, processing is executed (except the edit lock target program) by the input/output function.

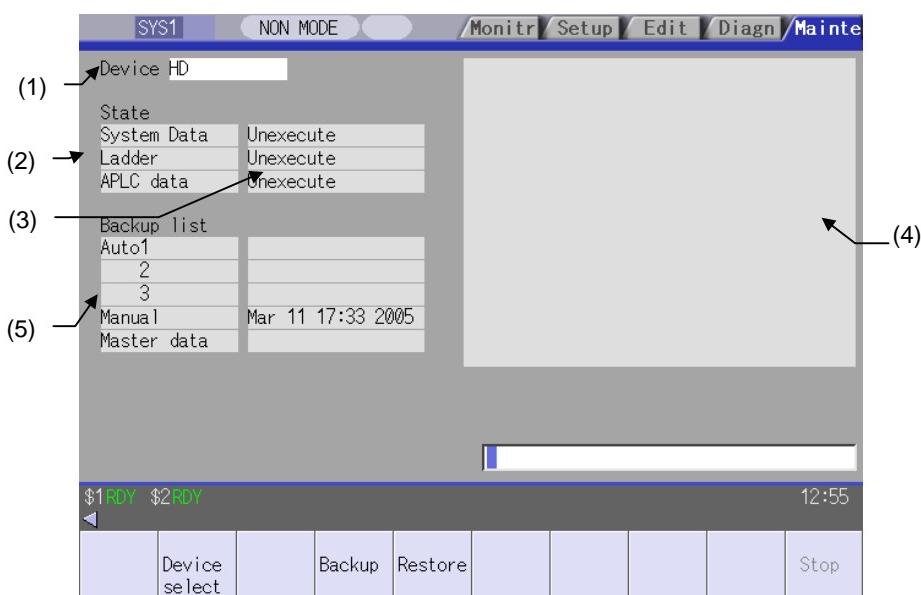
		Edit lock B			Edit lock C		
		Machining program			Machining program		
		A	B	C	A	B	C
Edit	Search						
	Edit						
	MDI registration						
Input/Output	Transfer						
	Compare						
	Copy						
	Merge						
	Rename						
	Erase						
Monitor	Buffer correction						

6.3 All Backup Screen

This screen is used to perform batch backups of NC memory data to an external device, and batch restoration of that data to the NC memory.

Data backed up by the automatic backup function can also be restored.

Data which has been automatically backed up can be selected only when the device set by the "#8919 Auto backup device" parameter setting is selected.



Display items

Display item	Details													
(1) Device name	This displays the selected device name.													
(2) Data name	This displays the data name being backed up/restored. System data, ladder, and APLC data are displayed.													
(3) Execution status	This displays the processing execution status. Processing is executed in the system data, ladder, and APLC data order. (Note 1)													
(4) Warning message	This displays messages at the start and end of backup/restore processing.													
(5) Backup list	This displays the backup date list. This date is the system data time stamp. <table border="1" style="margin-top: 5px;"> <thead> <tr> <th>Backup area</th> <th>Explanation</th> <th>Backup format</th> </tr> </thead> <tbody> <tr> <td>Auto 1 2 3</td> <td>Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.</td> <td>Auto</td> </tr> <tr> <td>Manual</td> <td>Data that was backed up on this screen.</td> <td>Manual</td> </tr> <tr> <td>Master data</td> <td>Data that was backed up on this screen. Generally, this is the factory settings data.</td> <td>Manual</td> </tr> </tbody> </table> <p>The above data can be selected at restore processing. (Note 2)</p>		Backup area	Explanation	Backup format	Auto 1 2 3	Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.	Auto	Manual	Data that was backed up on this screen.	Manual	Master data	Data that was backed up on this screen. Generally, this is the factory settings data.	Manual
Backup area	Explanation	Backup format												
Auto 1 2 3	Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.	Auto												
Manual	Data that was backed up on this screen.	Manual												
Master data	Data that was backed up on this screen. Generally, this is the factory settings data.	Manual												

(Note 1) "APLC data" cannot be backed up/restored if the optional "APLC" is disabled.

(Note 2) The "Auto 1 to 3" data display when the device set by the "#8919 Auto backup device" parameter is selected.

6. Maintenance Screen

6.3 All Backup Screen

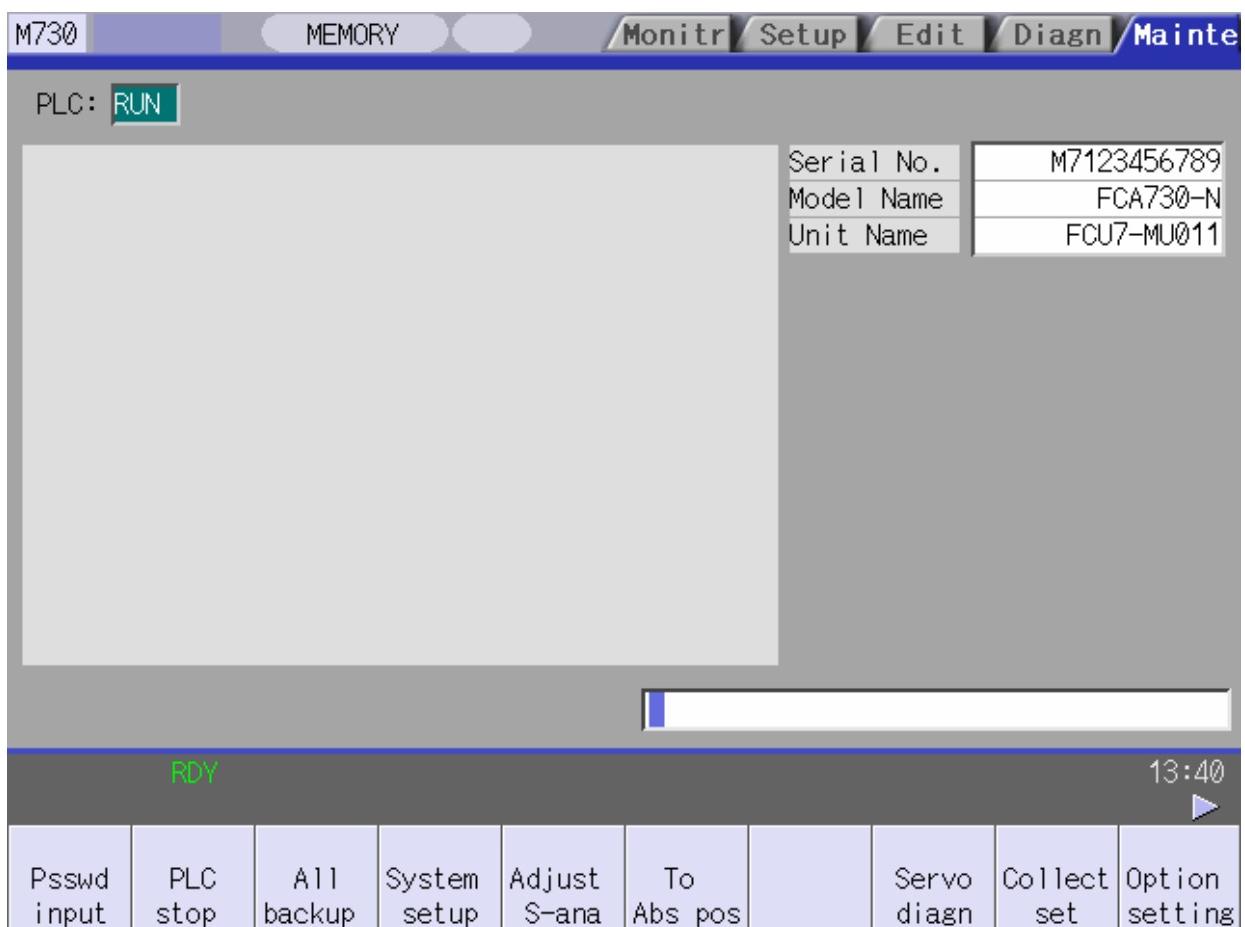
Menus

Menu	Detail	Type	Reference
Device select	This displays the sub-menu for "Device" selection.	C	
Backup	This executes backup processing.	A	6.3.1 Performing a Backup Operation
Restore	This executes restore processing.	A	6.3.2 Performing a Restore Operation
Stop	This stops processing.	C	

6.3.1 Performing a Backup Operation

Operation method

- (1) Press **Mainte** menu key.
- (2) Press **Psswd input** and input "MPARA" password.
- (3) Press **All Backup** menu key and **INPUT**.

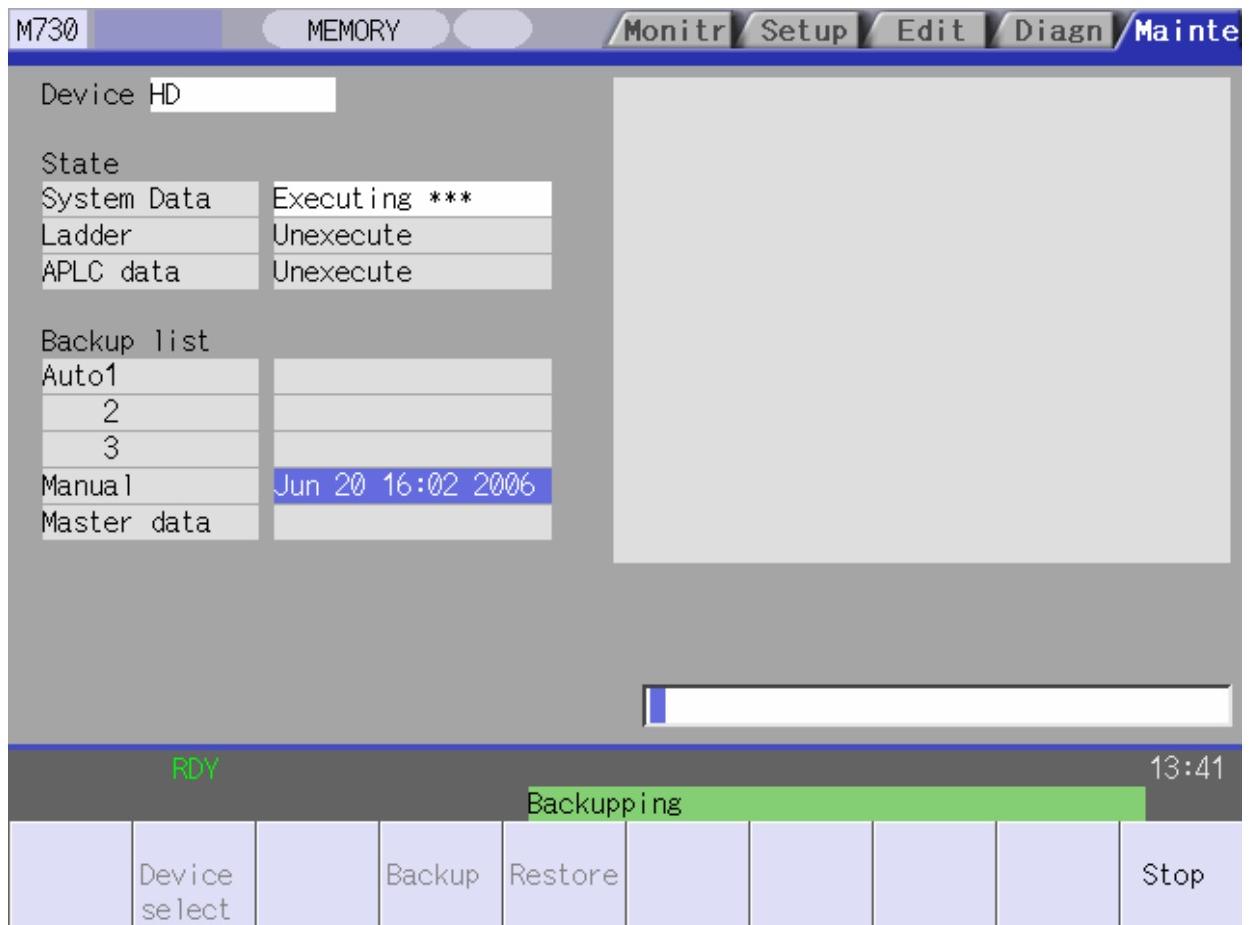


6. Maintenance Screen

6.3 All Backup Screen

(4) Display "Select directory to restore" (can ignore) and press **INPUT** will display " OK (Y/N)" then input "Y"..

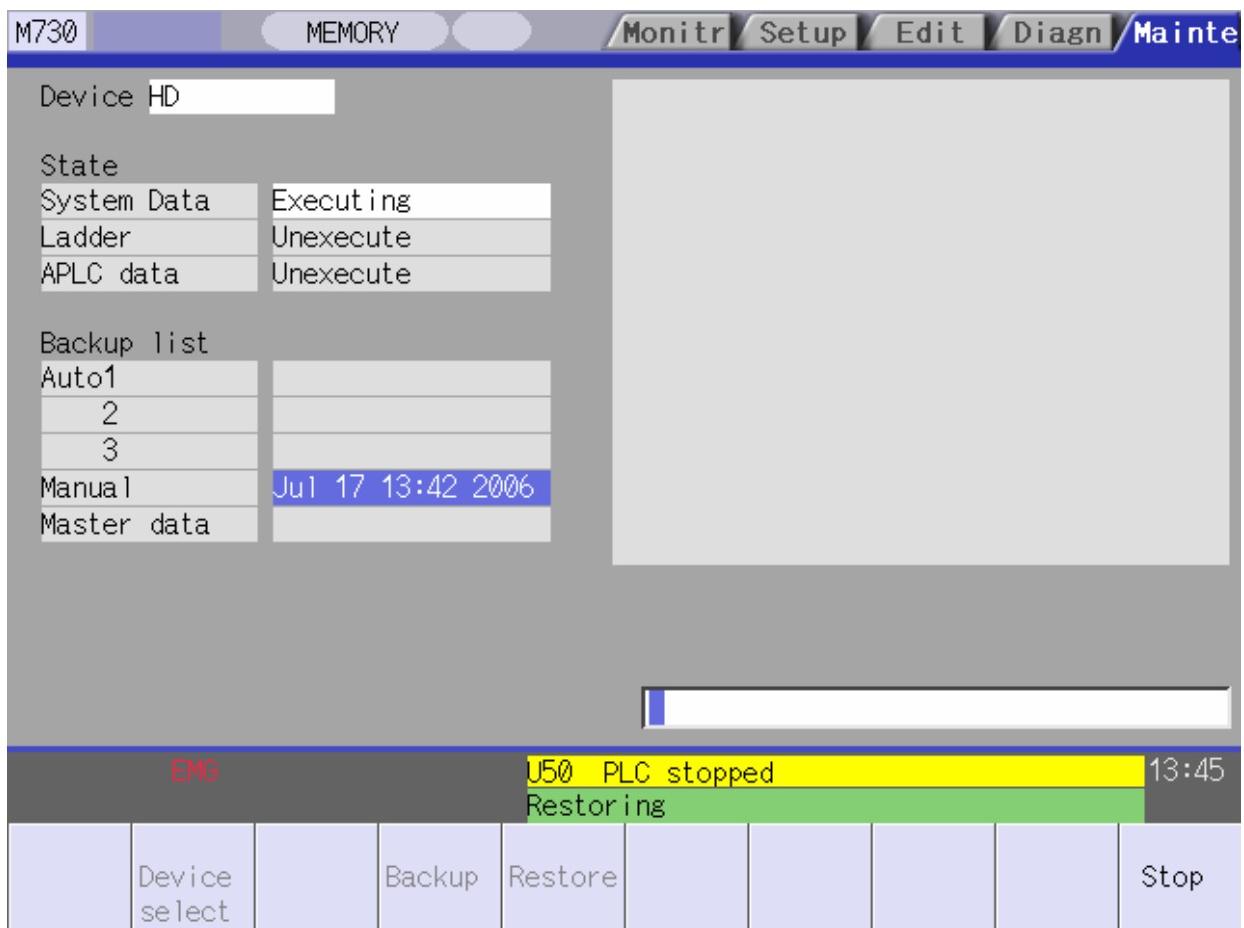
(5) Display Backup proceeding Screen.



(6) Finally display " Back Complete" . → Finish.

6.3.2 Performing a Restore Operation

- (1) Push “Emergency button” for safety
- (2) Press **Mainte** menu key.
- (3) Press **Psswd input** and input “MPARA” password.
- (4) Press **Restore** menu key and **INPUT**.
- (5) Display “Select directory to restore” (can ignore) and press **INPUT** will display “OK (Y/N)” then input “Y”..
- (6) Display “PLC running , Does it is stop ? (Y/N) and input “Y”.
- (7) Display “Restoring”



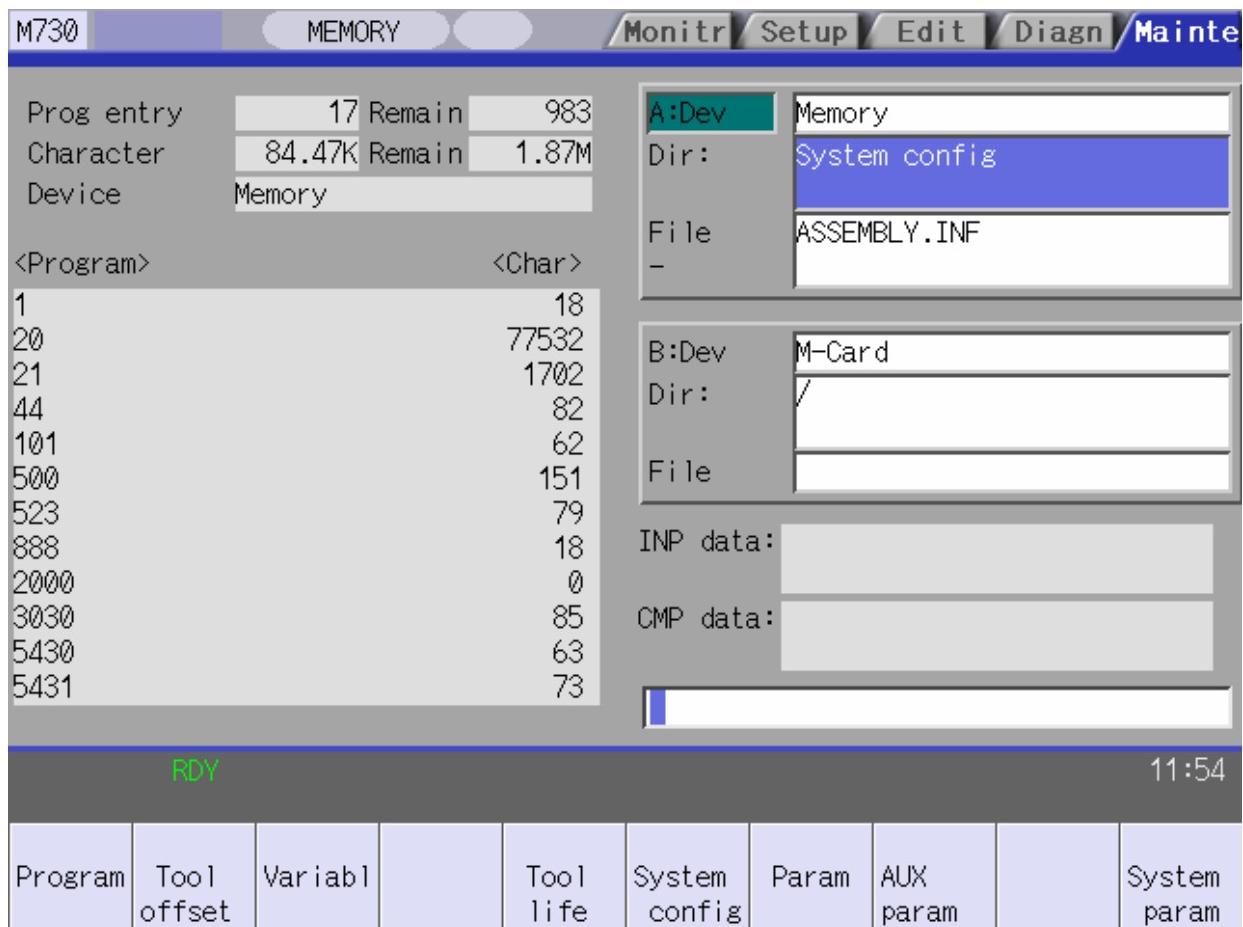
- (8) Display “Restore complete” → Finish.

6.3.3 Backup of NC Parts information

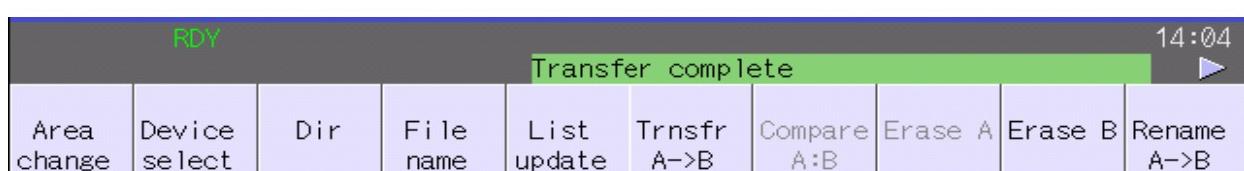
This function can output NC parts module list of machine include parts serial number by electronic file.

Operation method

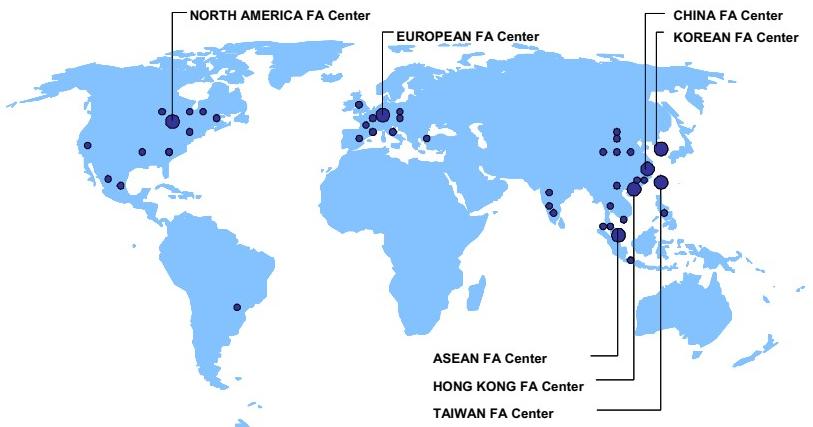
- (1) Push “Emergency button” for safety
- (2) Press **MAINTENANCE** function key.
- (4) Press **INPUT/OUTPUT** menu key and select **Device:A** for “Memory” and choose
Dir: **System Config**



- (5) Specify “B: Dev” for store devices (example : HDD,Memory card, Memory (NC)).
- (6) Press “Transfer A->B”
- (7) Display “transferring”
- (8) Display “transfer complete”



Global service network



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